JOURNAL

OF

THE FRANKLIN INSTITUTE

OF THE STATE OF PENNSYLVANIA

FOR THE

PROMOTION OF THE MECHANIC ARTS.

JUNE, 1850.

CIVIL ENGINEERING.

*Report of the Commissioners Appointed to Inquire into the Application of Iron to Railway Structures.**

Continued from page 302.

ANALYSIS OF THE EVIDENCE RECEIVED BY THE COMMISSION.

Chemical Constituents of Iron.—Mr. Morries Stirling states that iron in its pure state is malleable, and that it is a combination of carbon with iron which produces cast iron. In addition to carbon, the cast iron in this country contains silica, lime, magnesia, alumina, occasionally some of the phosphates, and other admixtures; but iron made from magnetic ores is much purer. The strength of cast iron depends upon its freedom from impurities and upon the proportion of carbon it contains. The strongest cast iron contains about three per cent. of carbon, or, according to Mr. Charles May, when the carbon is in the smallest proportion that produces fluidity; a larger proportion tends to make the iron soft and weak, and a smaller hard and brittle. Mr. Glynn states that the strongest iron generally shows a clear grey or slightly mottled fracture, and he considers that that color indicates the combination of carbon with iron which produces the greatest strength. Mr. Morries Stirling states that, while color is admissible as a test of strength, it is not so of chemical constitution, for though dark-colored iron is usually weak, grey iron usually strong, and white iron usually brittle, yet black iron when chilled becomes white, although it must be supposed to contain the same quantity of carbon; hence, as a general rule, he concludes that color indicates the treatment to which iron has been subjected, and in some cases only the quantity of carbon.

* From the London Civil Engineer and Architect's Journal, for February, 1850.

Mr. Charles May coincides in considering the question of strength to be very much reducible to the quantity of carbon contained in the iron, as some of the tenderest iron skilfully treated will produce some of the strongest castings. Mr. Stephenson and Mr. Morries Stirling mention that the fluidity of the Berlin iron is due to the presence of arsenic, and the latter has observed that manganese mixed artificially with cast iron closes the grain, and is an improvement both to cast iron and steel. On wrought iron the effect of manganese is stated to be to give it the hot short property, whilst the cold short is produced by the presence of a small quantity of phosphorus; and the admixture of arsenic renders wrought iron hard and brittle.

Qualities and Mixtures of Iron.—The use of the *hot blast* in the manufacture of iron, it is stated by Mr. Glynn, does not of itself make iron worse or better; but by its means, materials, otherwise intractable, yielding alloys of metal, may be smelted, instead of ores yielding purer metal. Mr. Morries Stirling has not found any distinct difference between the chemical constituents of hot blast and cold blast iron, but apparently there is more carbon in the hot blast iron, and graphite is more commonly to be seen on the surface of No. 1 hot blast than on cold blast iron. Mr. Charles May considers that, by the use of the hot blast, the quantity of carbon which can be combined with the iron is increased. Mr. Hawkshaw and Mr. Fairbairn consider hot blast iron weaker than cold blast; the latter gentleman and Mr. Stephenson state that the use of the hot blast renders the metal very fluid; and Mr. Glynn says that its use is to produce in large quantities, and at a cheap rate, a soft fluid metal to be employed in light castings, and that in that respect he considers the invention to be of great public benefit, as enabling Scotch iron masters to use a new kind of ore, which, though of a weaker character, further experience may enable them to purify and improve.

At the same time the hot blast is essential for smelting the iron-stone from South Wales with anthracite coal, and the metal yielded is of the strongest character. Mr. Glynn and Mr. Stephenson mention that generally hot blast iron is dark grey in color and very fine in the crystal; but it appears to be universally agreed that there is no certain method of distinguishing hot blast from cold blast iron. Mr. Rastrick states that the temperature of the hot blast at the Gartsherrie furnaces was 680° Fahrenheit.

Mr. Stephenson does not attach much importance to the variation in strength of different sorts of iron, he considers that taking the average of irons generally throughout the country there is a proximity to an uniform standard. He concludes, from a series of experiments made by him for the High Level Bridge at Newcastle, that hot blast iron is less certain in its results than cold blast; that mixtures of cold blast are more uniform than those of hot blast; that mixtures of hot and cold blast give the best results; that simple samples do not run so solid as mixtures; that simple samples run too hard and sometimes too soft for practical purposes. Mr. Rastrick would prefer making girders of forge iron. Mr. Hawkshaw would use the Lowmoor iron. It is, however, generally admitted that mixing irons from different parts of the country produces the best castings, and since the object in mixing them is to obtain the proportion of carbon to iron

which gives the greatest strength combined with the required degree of fluidity, the exact proportion will be regulated by the appearance of the fracture of the several irons.

Mr. Morries Stirling states that No. 1 hot blast iron, mixed with No. 3 cold blast, will give the right proportion of carbon; but that if iron containing that proportion could be obtained at once from the blast furnace, it would be very superior. Mr. Charles May, however, observes, that the strength of cast iron depends upon the bulk into which it is to be run as well as upon its constituent parts, and that the art of the iron founder consists in his ability to produce the required amount of strength without any very definite knowledge upon the subject, either chemical or mechanical. Mr. Fox considers a very good mixture for girders to be cold blast Blaenavon two-thirds, and of hot blast Scotch, two sorts, from the black band and the red hæmatite ores, one-third. Mr. Grissell considers the use of old scrap iron to be of immense value, and would use Scotch iron, cold blast Welch, and old scrap. Mr. Fairbairn names as the best mixture independently of price—

Lowmoor, No. 3, ...	30 per cent.	
Blaina, or Yorkshire, No. 2, ...	25 "	
Shropshire, or Derbyshire, No. 3, . . .	25 "	
Good Old Scrap, ...	20 "	= 100

Mr. Glynn names one-third strong iron from South Wales, and two-thirds of the more fluid metal of Yorkshire, Derbyshire, and Shropshire. Mr. C. Fox, Mr. Grissell, and Mr. Charles May, however, all concur in stating that mixtures of iron practically depend very much upon the commercial question of cost, and it is generally admitted that engineers have no guarantee that the mixture for which they may have stipulated in a contract shall be that used by the founder; hence Mr. Fox recommends that engineers, in contracting for a number of girders, should stipulate that they should not break with less than a certain weight, (leaving the mixture to the founder,) and cause one more than the required number to be cast; the engineer might then select any one to be broken, and if it broke with a less weight than had been agreed upon, the whole should be rejected. Mr. Glynn considers that the strongest castings are those cast from the air furnace in dry sand, and castings in loam are stronger than those in open sand. The metal is more dense and more free from impurity when cast upright. Mr. Fox and Mr. Fairbairn also prefer the air furnace. With respect to wrought iron, Mr. Morries Stirling considers the process adopted in its manufacture as capable of great improvement. Mr. E. Clarke states that wrought iron from the same maker is not always the same, and though there is not much difference in the ultimate strength of iron, that some qualities extend much more than others before breaking.

Proportion of Load to Breaking Weight in Girders.—There appears to be a considerable difference of opinion as to the proportion between the greatest load which a girder should be allowed to bear and the breaking weight. There are two conditions under which the weight may be applied, viz , first, when stationary, as in the case of water tanks, floors, &c.; second, when the weight moves so as to cause concussions and vibrations, as in railway bridges. In girders required for the first case, Mr. Fox and

Mr. T. Cubitt consider that the breaking weight should be three times the greatest load; Mr. P. W. Barlow four times; and Mr. Glynn would not make it less than five times the load.

In girders for railway bridges, Mr. Brunel states that he allows the load to be one-third or two-fifths of the breaking weight; but he considers that the rule he adopts for calculating the dimensions of his girders gives more than the usual strength. Mr. Grissell and Mr. Charles May consider one-third to be sufficient; Mr. Rastrick, Mr. P. W. Barlow, Mr. R. Stephenson, and Mr. Joseph Cubitt adopt one-sixth; Mr. Hawkshaw prefers one-seventh, except in cases where great care is exercised in the selection of materials and workmanship, when a smaller proportion would suffice; and Mr. Glynn considers that in structures exposed to concussion and vibration the ultimate strength of a girder should be ten times the greatest load.

Tests for Girders.—The general opinion as to the amount of test which should be applied to girders is, that the test should amount to twice the greatest load. Mr. Joseph Cubitt would employ three times the greatest load, or half the breaking weight; and Mr. Thomas Cubitt considers it safer to test a girder almost to the extent that would break it than not to prove it at all, as the testing of girders is the only means of discovering defects under the surface, and concealed from the eye. Mr. Brunel, however, thinks that a girder should not be tested with a weight exceeding the greatest load, as the object in testing is to ascertain the soundness of the casting, which may be judged of by its appearance under the load, and all risk of permanent injury should be carefully avoided. Mr. Rastrick, Mr. Glynn, and Mr. Joseph Cubitt recommend that blows be applied to cast iron girders when under the testing load. Mr. Hawkshaw and Mr. P. W. Barlow consider that, where actual weight is used, sufficient vibration is given to the beam by throwing the weight into the scales used in testing. It is stated that, for convenience sake, girders are usually tested by means of the hydraulic press; but Mr. Fairbairn, Mr. Locke, Mr. Brunel, Mr. Joseph Cubitt, and Mr. Fox prefer using actual weight, on account of the uncertainty as to the actual pressure the hydraulic press brings upon the girder; though the latter gentleman considers that all liability to error in the press is obviated by an improved construction which he has adopted. Mr. C. May states that, as girders are bought at the lowest possible price per ton, the manufacturer is compelled to adopt the most convenient and not the best mode for testing them, or ten times his profit would not pay him for the experiment.

Loads on the Bottom Flanch.—It is admitted that the mode of supporting the roadway on the bottom flanch of a girder causes torsion in the girder, though Mr. Rastrick and Mr. Locke do not consider that the strength is diminished by the pressure being so applied; and Mr. Stephenson does not think the torsion is of sufficient consequence to be noticed. In order to guard against any ill effects which might arise from the torsion, Mr. Locke fits in transverse pieces of timber between the two girders which support a line of rails, chocked perfectly tight, and he ties the bottom webs together with tension bars. Mr. Fairbairn and Mr. Hawkshaw consider it would be advantageous to alter the form of girders to enable them to withstand

the torsion. Mr. Fairbairn thinks the cross beams should either lay on the top flanch, or be suspended by hook bolts from the bottom flanch, in which opinion Mr. Glynn concurs. Mr. Hawkshaw would increase the top flanch of the girder, or would cast shoes or brackets on them to bring the bearing of the transverse joists close to the vertical web. Mr. P. W. Barlow has adopted a new form of bridge to avoid this torsion. Mr. W. H. Barlow observed considerable torsion in a girder without any top flanch. Mr. Fairbairn and Mr. Hawkshaw are of opinion that wooden cross-bearers for the roadway are liable to increase the amount of torsion by bending; but Mr. Stephenson and Mr. Brunel state that wood is desirable as a cushion to prevent the noise and vibration which iron on iron would be subject to.

Length for Simple Cast Iron Girders.—The use of simple cast iron girders in bridges appears to be limited only by the power to make sound castings, which arises chiefly from the difficulty of pouring the metal equally, and the inconvenience of handling large masses. Mr. Rastrick, however, would not put any limit to the length. Mr. Hawkshaw considers that they may safely be made more than 50 feet long; in which opinion Mr. Fox and Mr. Grissell concur, but name 60 feet as the limit. Mr. Glynn, Mr. Charles May, and Mr. Joseph Cubitt would make them from 40 to 50 feet. Mr. P. W. Barlow, Mr. Fairbairn, Mr. W. H. Barlow, and Mr. Stephenson state 40 feet as the limit; and Mr. Brunel names 35 feet, as he does not consider that sound castings can be ensured to a greater length. Mr. Fairbairn, however, mentions a girder in Holland 70 feet long cast in one piece.

Form for Simple Girders.—It appears to be universally admitted that the form resulting from Mr. Hodgkinson's experiments on the tension and compression of iron is that which gives the greatest strength; but the actual proportions are generally modified to suit the varying circumstances under which girders are employed. Mr. Stephenson sometimes makes the top flanch equal to the bottom one, but usually in the proportion of 3 : 5, partly to obviate any risk from unequal cooling of the materials, and partly from the necessity of having a large top flanch to bolt the flooring to. In preference to using a single girder, Mr. Stephenson recommends two girders to be bolted together, with a baulk of timber between, to which the rail is fixed. Mr. Hawkshaw, Mr. Fox, and Mr. Joseph Cubitt recommend that the top flanch be increased beyond the proportions given by Mr. Hodgkinson, in order to resist the lateral torsion. Mr. W. H. Barlow and Mr. Locke would use the arched form of girder whenever practicable, and the former gentleman says that straight girders have been in fashion, and consequently more used than practice actually required. Mr. Fox, in girders subject to dead weight only, would make the proportion of the top flanch to the bottom one as 1 : 6; but in railway bridges he recommends 1 : 4. Mr. Thomas Cubitt mentions that shoes or sockets, or any projections cast on girders, have a tendency to create flaws from causing the dirt to accumulate in those places, and he considers that the shape which will ensure a sound casting should be as much considered as the theoretical form of greatest strength.

Deflexion of Girders, and Effects of Permanent Loads and Change of Temperature.—It is considered that girders should not deflect more than from $\frac{1}{800}$th to $\frac{1}{400}$th of their length according to the form of the girder. It does not appear from the evidence that a weight equal to what a girder is constructed to carry, will, even if left on for any length of time, cause the deflexion of the girder to increase, unless subjected at the same time to considerable changes of temperature. Some experiments made by Mr. Fairbairn and Mr. Braidwood, show that iron loses a considerable proportion of its strength when heated to a temperature of more than 220° Fahr., and that it becomes uncertain below 32°. Mr. Clarke described the effect of the sun coming out and shining on the Conway tubular bridge for half an hour to have been to raise the tube vertically one inch; and he mentions that at night, from the low temperature, the deflexion was always greater than in the day-time. Mr. Fox instances the effect of frequent and great changes of temperature on some short girders, 6 feet long, which support the hoods of the forges in his workshops. In the day-time they are so warm that the hand can only just bear the heat; at night they become cold. The effect is to make the girders *swag*, and the swagging appears to be continually increasing. Some have attained as much as 3″ deflexion in the centre; but their strength does not seem to be impaired.

The general impression of engineers appears to be that the deflexion caused by passing a weight at a high velocity over a girder is less than the deflexion which would be produced by the same weight at rest; and the increase observed, in many instances, is attributed by Mr. Locke, Mr. Stephenson, and Mr. Fox to the inequalities at the junction of the rails, or to the jerks of the engine. Mr. Hawkshaw, however, considers that the deflexions would be increased, and has given some examples of a manifest increase.

Mr. P. W. Barlow has observed a slight increase, and Mr. W. H. Barlow, in reference to this subject, cites a curious phenomenon which he observed on a timber viaduct, viz., that with a heavy goods train at a low velocity, a certain amount of deflexion was produced; but an express train passing immediately afterwards, with a much lighter engine, seemed to push the bridge like a wave before it.

Forms of Girders Beyond the Limits of Simple Cast Iron Girders.—The modes of construction which have been adopted by engineers for crossing spans beyond the limits of girders made of a single casting are very various; but the chief forms which have been adopted by engineers for girders of a compound nature in railway bridges may be classed under straight built girder of cast iron in separate pieces, bolted together; arched girders of cast iron; trussed girders; bow-string girders; wrought iron box and tubular girders.

The Built Girder is formed of separate castings fitted closely at the joints and bolted together, and is entirely dependent upon the bolts for support. Mr. Grissell instances one of 120 feet span, and states that he should have no hesitation in making one of 200 feet span; but the engineers generally seemed to consider that other modes of construction disposed the material

more advantageously. Mr. P. W. Barlow exhibited a new form of girder in separate castings, for moderate spans.

The Arched Girder.—The cast iron arch is a mode of construction which all engineers concur in approving of, when not limited by considerations of levels or of abutments. Mr. Locke states he would never willingly use cast iron in any other shape than that of an arch. Mr. W. H. Barlow has also adopted it where practicable.

The Trussed Girder is straight and of separate castings bolted together, assisted by wrought iron tension rods. The Dee Bridge girder was on this principle. Mr. Stephenson caused an experimental girder to be made, to exhibit the effect produced by the tension rods, adjusted as they were in the Dee Bridge girders, as well as the effect when adjusted to lie parallel with the bottom flanch and adjoining it; these experiments, in conjunction with some made by Mr. T. L. Gooch, show that the tension rods, though they do not, when acting at the angle, as they did in the Dee Bridge girders, produce the full effect; yet that they add considerably to the strength of the girder. Mr. Rastrick and Mr. Fairbairn object to the trussed girder on account of the different rates of expansion in cast and wrought iron. Mr. Stephenson and Mr. Wild propose to obviate this objection by putting the tension rod along the bottom flanch, and applying to it an initial strain of five or six tons per square inch, so as to cause the wrought iron to come into play as soon as any weight is applied to the girder. Mr. Fox approves of this arrangement, but he considers that a strain upon wrought iron tends to stretch the metal permanently, and that the tension rods would require to be tightened periodically, whilst Mr. Stephenson and Mr. Wild have concluded from their experiments, that with a less weight than ten tons per square inch, the elasticity of the metal is not affected. The measure of the strain upon the tension rods is the amount they are actually elongated by screwing up. As a combination of wrought and cast iron, Mr. P. W. Barlow has proposed to cast a bar of wrought iron in the bottom flanch of a girder, and not to make the bottom flanch so large. Mr. Locke, Mr. Stephenson, and Mr. C. May considered that the different rates of expansion of the two metals would be an objection to it. Mr. Brunel objects to the use of cast iron in long spans, and its combination with wrought iron, and prefers a framing of wrought iron and wood.

Bowstring Girder.—Mr. Hawkshaw, Mr. Glynn, Mr. W. H. Barlow, Mr. Locke, Mr. Fox, and Mr. Joseph Cubitt, are agreed in considering the bowstring form of girder, with a bow either of cast iron or wrought iron cells, and the tension rods of wrought iron, as free from any objections urged against other modes of combining wrought and cast iron. It is considered applicable under almost all circumstances, as the roadway can be suspended from the bow.

Box or Tubular Girders.—Mr. Fairbairn considers these girders the best for large spans, and from some experiments he made, considers them capable of resisting not only dead weight but also impact. Mr. Stephenson states that they are cheaper and more elastic than other forms for spans of

more than 40 feet, and he recommends that the top should be made of cast iron to resist compression. Mr. Glynn and Mr. Locke mention that they have been used for steam engines for some time, and consider the plan sound. Mr. Brunel looks upon the introduction of wrought iron into the construction of girders as the most important step that has been taken for some time in engineering; and he considers that, with ordinary care, and with the improvements which have been introduced in the mode of riveting, the joints made by riveting may be as permanent, and in every respect equal to the other parts of the structure, and he does not consider oxidation or vibration can affect them. With respect to riveting, Mr. Brunel considers that two plates could be riveted together so as to ensure their not breaking in any part contiguous to the rivets or joints, because the rivets should not act as pins or bolts, but as clamps, which, by pressing the plates together, produce an enormous friction. Mr. Clarke, however, who has made a good many experiments on the subject, does not appear to have obtained so close an union of the plates, as he states that they generally broke at the riveting. Mr. Hawkshaw has adopted wrought iron girders for large spans, because he considers the use of wrought iron more advisable than cast iron for large spans; the box form is adopted to produce lateral stiffness. Mr. Fox and Mr. Rastrick consider that a large structure, like the Menai Bridge, must be subject to sudden compression and extension from the changes of temperature.

Suspension Bridges.—Mr. Stephenson does not consider suspension bridges applicable to railways except to very small extent; and he states that he has been informed that an engine and train passing over one at Stockton, (which has since been replaced by a girder bridge,) pushed the bridge like a wave in front of it. Mr. Brunel states that, under very peculiar circumstances, he once proposed a suspension bridge himself. Mr. Brunel considers that the lattice bridge is advantageous only under circumstances which would prevent materials of more than a certain length being procured. Mr. Stephenson objects that the compression cannot be carried through them, and that the base through which the strain has to be carried is not sufficiently broad. It is stated, however, that Sir J. M'Neill has remedied the want of power to resist compression by introducing a cast iron top.

Best Form for Bridges Independently of Expense.—Mr. Rastrick, Mr. Hawkshaw, Mr. Fox, Mr. P. W. Barlow, Mr. Glynn, Mr. Locke, Mr. Brunel, and Mr. Cubitt, agree in considering that the best form for iron bridges of large span is that of a cast iron arch. Mr. Grissell states that he considers a well made straight girder equally to be depended upon, but admits that the arch is the strongest form; and Mr. Fairbairn says that for spans beyond 70 or 80 feet he would prefer wrought iron tubular girders. Mr. Stephenson would use narrow wrought iron girders.

Action on Skew Bridges.—It does not appear that the deflexion of girders is sufficient to cause oscillation in engines passing over skew bridges, by causing one side to be deflected to the full amount before the other. But Mr. Stephenson mentions that when the road has been in bad order,

one wheel being on the solid angle of the brickwork, while the other was on the soft ballast, has caused considerable oscillation.

Effect of Impact and Vibration.—It is not admitted that the vibration caused by a railway train on bridges would injure the bolts or rivets of compound girders, if well made and strong in the first instance. Mr. Grissell gives them a large amount of surplus strength, as he thinks that when no greater strength of iron is put than is absolutely necessary, every jar must tend to loosen the joints, and he considers that vibration has much more effect on wrought iron than on cast iron. Mr. Fox states that he would not depend on a cast iron girder of separate pieces bolted together without strengthening it with a wrought iron tie-bar, but the use of wooden sleepers interposes a cushion which does away with the vibration. Mr. W. H. Barlow mentions that with light engines he found felt very useful in diminishing vibration, but that with the heavy weights now in use on the Midland line any interposing medium is crushed out. Mr. Stephenson attaches no great importance to vibration, and has laid iron girders on brick without interposing medium; and the fact of old cast iron mill-work having run for so long a time without breaking is cited by Mr. Hawkshaw, as an instance of the apparently small effect of vibration. Mr. W. H. Barlow considers that the irregularities which exist on the road from uneven joints, &c., in the rails, is a greater cause of danger than vibration, and he mentions that, to experiment on the impact, he caused the rails to be white-washed for a mile before the passage of a fast train of 12 carriages, and that the small imperfections in the joints caused spaces adjoining them of 5 inches in length to be left untouched by any of the wheels in the train.

Change of Internal Structure in Iron.—Mr. Rastrick mentions that, at the Pont-y-Pool Iron Works, a bar of wought iron, suspended and continually struck by a hammer at the bottom, dropped in two after a length of time, but he knows of no instance of a change of structure on railways. Mr. Hawkshaw, though he has observed crystallization in broken rails and axles, has not traced it directly to vibration; he thinks mill-gearing and shafts would furnish good examples, though when they break the various circumstances under which the fractures have taken place should be observed. Mr. Grissell has observed that the vibration to which crane chains are exposed changes the iron from very beautiful malleable iron to the crystalline appearance of cast iron. He does not consider that cast iron is subject to the alteration of structure. Mr. Fox considers that vibration does produce a change in the internal structure of wrought iron, and instances that if the thread of a screw be cut in a wrought iron bar, and that the bar be broken across the tapped part, the fracture there will be found more crystalline than at the other part: he mentions the frequency with which shafts and mill gearing break, and states that cold-hammering the axles to give them a high polish changes their internal structure; but instead of remedying the injury by annealing, he recommends that they should be finished at a high temperature.

Mr. Grissell mentions that chains of cranes often break with a crystalline fracture, which he attributes to a change in the internal structure, but he does not consider the same effect is produced in cast iron. Mr. Fairbairn

states that repeatedly making a wrought iron bar red-hot, and plunging it into cold water, renders it crystalline, and that the fibrous texture may be restored by annealing; he considers that percussion renders the fibres more liable to break off short, but that without it is sufficient to cause a considerable increase of temperature, it does not produce any real internal change. Mr. Glynn considers that the structure both of wrought and cast iron is altered by a succession of blows, the wrought to a crystalline structure, the cast to larger crystals; he has observed this appearance particularly in axles, mill-shafts, toothed wheels, crowbars, and crane chains; the latter even when specially made of strong fibrous iron require to be annealed after about three years; the axles of tenders to which breaks have been applied he mentions as particularly subject to this change. He attributes the alteration to galvanic action, induced by the alloys from which iron is never entirely free, and considers that the action is increased by blows. He also mentions that brass wire, of copper and zinc, originally tough and fibrous, continually breaks off short with a crystalline fracture radiating in the form of a star, showing a change in the structure such as would have taken place if the metal had been melted and had crystallized in cooling; this effect is more rapidly produced in an atmosphere containing sulphuric acid. Mr. W. H. Barlow mentions having caused a piece of fibrous iron to be hammered for a long time by a blacksmith, and that he found the iron changed from a fibrous to a crystalline structure; but as axles do not undergo the same sort of hammering, he does not know whether the same effect takes place in them.

Mr. Stephenson considers the fact of an alteration of structure as highly improbable, and cites the connecting rod of an engine having vibrated 25,000,000 times, and yet being perfectly fibrous. In the cases of axles, the iron may not have been fibrous in the first instance, for though when a piece of iron is rolled from 1 foot in length to 20 feet it necessarily becomes fibrous, it does not necessarily become so when rolled from 1 foot in length to 6 feet. He says that in all the cases of change of structure which he has heard of, there has always been some important link wanting. Mr. Locke considers that concussion would alter the structure of iron, but would not offer an opinion as to whether the fracture of axles arose from that cause; he mentions that a great many axles broke when the crank axles were in use, but that since straight axles have been adopted fewer breakages have occurred. Mr. Brunel doubts the change of internal structure, and thinks the various appearances of different fractures result as much from the mode in which the iron has been broken as in any change in structure, and that change of temperature will also produce a variation in the fracture; that iron in a cold state shows a more crystalline fracture than the same iron warmed a little, and that wrought iron does not actually become crystalline and fibrous, but breaks either fibrous or crystalline according to the combination of circumstances under which it is broken, but with the combination required he is not acquainted; he cites the stratification and planes of cleavage of rocks, which may be broken with different fractures according to the mode of applying the blow. Mr. Brunel exhibited various specimens broken, some with a fibrous fracture by means of a slow heavy blow, and some with a crystalline fracture by means of a sharp short blow. Mr. Charles May cites the beam of a steam engine as

an instance of continued vibration not affecting iron, and mentions as an instance in favor of the change, the fact that a gun used in his works to break pig iron across, at last dropped in two as if it had been cut.

Greatest Weights on Railways.—Mr. Hawkshaw states that locomotive engines are the greatest weights which can come on railways, and reckons $1\frac{3}{4}$ tons per foot linear as the greatest weight for a single line of way. Mr. Fox, Mr. Fairbairn, and Mr. Brunel, mention $1\frac{1}{2}$ tons. Mr. W. H. Barlow states that on the Midland there are engines on four wheels weighing 32 tons exclusive of the tender, but that that weight is too great for the permanent way, and that the rails are crushed and flattened by it. Mr. Stephenson and Mr. Locke state, 1 ton per foot linear is the greatest weight which comes on a single line of rail.

On the Street Paving of the Metropolis, with an Account of a Peculiar System adopted at the London and North-Western Railway Station, Euston Square. By Mr. W. Taylor.*

The paper commenced by directing attention to the importance of a good system of paving, in conjunction with a more perfect plan of sewage, for all large towns. The paving of the metropolis had too long been carried on under an antiquated and unscientific system, of using large masses of granite placed on insufficient substratum; the consequences of this were great noise, an imperfect foot-hold for the horses, danger of the constant fracture of the springs and axles from the jolting over an uneven surface, and great expense of repairs. The "macadamized" streets were manifest improvements on such a system, but the surface was not found capable of resisting the heavy traffic of the main thoroughfares of the city. The defects of the wood pavement so greatly exceeded the merits that it had been nearly abandoned.

Impressed with the disadvantages of the present system of paving, Mr. Taylor tried an experiment about ten years ago, by covering a surface subject to very heavy traffic,—and subsequently, about five years since, entirely paving the departure side of the Euston Station of the London and North-Western Railway in a peculiar manner. The system was on entirely new principles. The method employed was, after removing the subsoil to the depth of sixteen inches, to lay a thickness of four inches of strong gravel, equally and well rammed, then another layer of gravel mixed with a small quantity of chalk or hoggin, for the purpose of giving elasticity, the ramming being continued as before; a third coat, of the same materials, was then laid and rammed, a regular degree of convexity of surface being preserved. The stones used were Mount Sorrel granite, dressed and squared into regular masses of four inches deep, three inches thick, and four inches long; these stones were laid in a bed of fine sand one inch in thickness, equally spread over the surface of the substratum, and they were carefully placed, so that no stone should rock in its bed. The whole surface was then well driven down with wooden rammers, weighing fifty-five pounds each. The small size of the stones enabled them to be well ram-

* From the London Athenæum, for March, 1850.

med home, so that the surface of the pavement never sank, and the hardness and toughness of the material prevented the stones from being worn down by any traffic, however heavy.

It was stated that this system was found infinitely preferable to the employment of large stones, and the statement of cost was vastly in its favor, the price of the ordinary kind of granite paving, in London, being 18*s.* per superficial yard, and the maximum cost of the new or "Euston" pavement, including the substratum, was not 12*s.* per yard, and deducting the value of the old stones, not (in this latter case) claimed by the contractor, the net cost would only be 9*s.* per yard.

It was suggested that the different Paving Boards should make a trial in streets of small traffic, by lifting the large stones, and cutting them into small cubes or rectangular pieces of three inches in depth for the future pavement; so that a good field would be afforded for the practice of the paviors, which would enable them to be better qualified for the task of extending the system to the more important thoroughfares. By this means, too, a large surplus of stone would be accumulated for paving, and the refuse would be valuable for macadamizing the roads in the outskirts.—*Proc. Inst. Civ. Eng.*

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*The Pneumato-Spheroidal Engine.**

The attention of the Continental engineers is again called to the pneumato-spheroidal engine of M. Testud de Beauregard. It will be remembered that this engine is constructed on the principle which has been so ably investigated by M. Boutigny, of employing water in the spheroidal state; this condition being induced by allowing it to drop into heated metal tubes. Although the water never acquires the boiling temperature, the vapor escaping from it has the high temperature of the metal with which it was in contact, and is therefore in the highest state of tension. An engine of this construction has been at work for some months in the atelier, 162, Faubourg Saint-Denis, and it is said to act exceedingly well, and to be very economical.

Opening of the Britannia Tubular Bridge.†

The opening of this magnificent structure came off on Tuesday, March 5th, at dawn, with the grandest success. At half-past 6 o'clock, A. M., three powerful engines, of from 50 to 60 horse power each, decorated with flags of all nations and union jacks, steamed up, and, harnessed together, started from the Bangor station, carrying Mr. Stephenson, who drove the first engine through the tube, and other gentlemen. At precisely 7 o'clock the adventurous convoy, progressing at a speed of seven miles an hour, was lost sight of in the recess of the vast iron corridor. Instead of being driven through with a despatch indicative of a desire on the part of those who manned it to get in and out with the utmost expedition, the locomotives were propelled at a slow and stately pace, with the view of boldly

* From the London Athenæum, for March, 1850. †Ibid.

proving, by means of a dead weight, the calibre of the bridge at every hazard. The total weight of the locomotives was 90 tons.

The appearance of the interior of the tube during the interesting experiment was of a novel and remarkable character. The pauses that occurred during the progress of the transit furnished an imposing view of the interior of the gigantic structure, which, as contrasted with that of a tunnel of similar length, was rendered comparatively cheerful by the recurrence at intervals of loopholes of light, which serve the three useful purposes of ventilating, lighting, and divesting the tube of steam from the passing engines. The locomotives were brought to a standstill in the centre of each of the great spans, without causing the slightest strain or deflexion. The first process, that of going through the tube and returning, occupied altogether 10 minutes.

The second experimental convoy that went through consisted of twenty-four heavily laden wagons, filled with huge blocks of Brymbo coal, in all, engines included, an aggregate weight of 300 tons. This was drawn deliberately through, at the rate of from eight to ten miles an hour, the steam working at quarter power. During the passage of this experimental train through the tube, a breathless silence prevailed that was almost solemn, until the train rushed out exultingly, and with colors flying, on the other side of the tube, when loud acclamations arose, followed at intervals by the rattle of artillery down the Straits. Upon the return, which occupied about seven minutes, similar demonstrations ensued; and during the progress of the train, those who stood upon its top to ascertain any possible vibration, reported they could detect no sensible deflexion.

After this, Mr. Stephenson and his staff steamed up to Plas Llanfair, Mr. Foster's seat, and partook of a handsome repast. Meantime the locomotives were passing up and down the interior of the tube without eliciting the slightest manifestation of strain. An ordeal stronger still was then resorted to; a train of 200 tons of coals was allowed to rest with all its weight, for two hours, in the centre of the Carmarthenshire tube; and at the end of the time, on the load being removed, it was found to have caused a deflexion of only four-tenths of an inch. It is remarkable that this amount of deflexion is not so much as one half-hour of sunshine would produce upon the structure; it being, moreover, calculated with confidence that the whole bridge might with safety, and without injury to itself, be deflected to the extent of 13 inches. These loads, it is most material to remember, are immensely more than the bridge will ever be called on to bear in the ordinary run of traffic; though the engineers are of opinion that it would support with ease, and without much show of deflexion, a dead weight on its centre of 1000 tons. Twelve miles an hour is the limit of speed at which Mr. Stephenson intends that trains shall at first go through, more particularly as there are sharp curves at the termini of the tube.

It being now nearly 12 o'clock, another testing train was prepared to be taken through the tube. It consisted of the three engines, the 200 tons of coal, and from 30 to 40 railway carriages, containing between 600 and 700 passengers, packed together as closely as figs in a basket, all so clamorous and eager to "go through the tube" that it became impossible to accommodate them. At length, obediently to a long wild whistle, the train, which was almost long enough to cover the extent of tube, glided slowly

into the interior, saluted by a loud burst of "Rule Britannia," from an array of Liverpool seamen up aloft in the towers at the entrance, on the front of which, cut deeply in the stone, were the words "Erected Anno Domini 1850: Robert Stephenson, Engineer." As the huge train trailed slowly through the tube successive salvos of artillery were fired at each end. This accomplished, the steam was got up, and the company assembled proceeded at the rate of 35 mile an hour, amid the magnificent scenery and snow-capped hills of Wales, to Holyhead, where they were received by all the principal townspeople, and with salutes from the steam ships in the harbor.

The effect of the recent hurricane on the calibre of the tube has proved that its lateral surface strength is sufficient, and far more than sufficient, to resist the strongest wind. It is calculated that, taking the force of the wind at 50 lbs. on the square foot—an excessive supposition—the resistance offered by the bridge would be 300 tons $\times$ 2=600, which is not two-thirds of its own weight. The wind going at 80 miles an hour, the rush of a hurricane would only press in the ratio of 128 tons on the side. It is intended, when both tubes are up, to brace them together with stays, so as to counteract any possible oscillation.—*London Times.*

AMERICAN PATENTS.

List of American Patents which issued in January, 1850, *with Exemplifications by* Charles M. Keller, *late Chief Examiner of Patents in the U. S. Patent Office.*

1. For an *Improvement in Pen and Pencil Cases;* Albert G. Bagley, City of New York, January 1.

The patentee says,—"The nature of my invention consists in providing an auxiliary interior tube, to lock with the sliding outside tube, to make a stronger case than those heretofore used, and to make the two outside tubes fit closer together; making a neater joint, and a longer pen case, when drawn out."

Claim.—"I claim the auxiliary interior tube, in combination with the two outside tubes, in the manner substantially as described, and for the purpose set forth."

2. For *Improvements in Combining Grinding and Bolting Machines;* James M. Clark, Lancaster, Lancaster county, Pennsylvania, January 1.

The patentee says,—"My invention consists in the combination of a grinding mill and bolter, all on one shaft, and grinding and bolting flour at a single operation."

Claim.—"What I claim as my invention, is the combination of an adjustable grinding mill with an adjustable bolting machine, both worked on one shaft, and adapted to each other so that both or either can be adjusted independent of the other, substantially in the manner and for the purposes above made known."

3. For an *Improvement in Instruments for Paring Horses' Hoofs;* Ashley Crafts and Ebenezer Weeks, Auburn, Geauga county, Ohio, January 1.

Claim.—"What we claim as our invention, is the combination of the gripe, arm, and knife, whether made with or without the adjustive plates and joint-pin, or in any way substantially the same, and of any suitable size and material."

4. For an *Improvement in Hemp Brakes;* Jonathan Crane and F. H. Hamilton, Schenectady, New York, January 1.

Claim.—"What we claim as our invention, is the combination of the revolving rollers

with the swords or beaters, arranged and operating substantially in the manner herein described."

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5. For an *Improvement in Coal Grates;* Chauncey O. Greene, West Troy, Albany county, New York, January 1.

Claim.—"What I claim as my invention, is the formation of a revolving cylinder grate by placing circular grate bars or flanches around a hollow cylinder, a draft of cold air being passed through the said hollow cylinder for the purpose of cooling the same, at the same time making it answer the purpose of a hot air chamber, substantially as described."

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6. For *Improvements in Operating Shuttle-Boxes in Looms;* Alfred Jenks, Bridesburgh, Philadelphia county, assignee of Robert B. Goodyear, Philadelphia, and Benjamin Hirst, Manayunk, Philadelphia county, Pennsylvania, January 1.

The patentees say,—"Our invention consists, first, of a sliding block of cams, arranged and operated in the manner herein set forth, for shifting a series of shuttle-boxes containing shuttles with filling of different shades or colors; and second, in a device by which the loom stops itself whenever the shuttle does not arrive in its proper box at the proper time."

Claim.—"What we claim as new, is shifting a series of shuttle-boxes, substantially as herein set forth, by means of a corresponding series of cams, acting through levers, cords, or other means, severally brought into action at the required intervals, by the pattern wheel face cam and spring, or other equivalent devices; the whole arranged and operated substantially as described."

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7. For *Improvements in Hemp Scutchers;* F. H. Hamilton and Thomas Bullock, Schenectady, New York, January 1.

The patentees say,—"The nature of our invention consists in making a circular head or back upon a horizontal shaft, upon which head or back we place the knives or scrapers in an angular position, and also tangentially from the head or circle drawn around the centre to the periphery, by which arrangement and combination we obtain the beneficial results hereinafter named and described."

Claim.—"What we claim as our invention, is the combination of the circular back or head with the inclined knives or scrapers, and the hub and rest, substantially as herein mentioned."

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8. For an *Improvement in Connexions of Brakes with Cars;* John Kimball and Harvey Rice, Concord, Merrimack county, New Hampshire, January 1.

The patentees say,—"This invention consists in placing a tube, coating, or lining of India rubber, or other elastic substance, around a link or pin passing through a box or casing which contains the brake or other portion of machinery, and enclosing and confining such rubber or other substance by such box or casing, so as to hold the rubber in a permanent position, except so far as its elasticity is affected by the pressure or motion of the link or pin, whenever the brake or other portion of machinery is used.

"Also, constructing such brake or other portion of machinery with a second box or casing enclosing the outer end of the link, one end of which box is secured by a bolt or bolts to the brake or other portion of machinery, thereby forming a double joint to the brake, and enabling the brake to be applied so as to adapt itself to the wheel at all times with the same force through the whole arc of the brake, and not more at the top of the brake than at the bottom."

Claim.—"What we claim as our invention, is the enclosure of the said link or pin in a tube, coating, or lining of India rubber, or other elastic substance, and securing said rubber in a box or casing, so as to confine the same permanently, in such a way as to allow the action of the brake or other machinery, without wear or friction, rattling or noise."

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9. For an *Improvement in Washing Machines;* Ransom Marean, Lawrenceville, Tioga county, Pennsylvania, January 1.

The patentee says,—"My invention consists of a moving bed of rolls, arranged in such manner that they are turned with different velocities; the clothes being rubbed and turned by the rolls, and squeezed between them and a compressor, much in the same manner as in ordinary hand washing."

Claim.—"What I claim as my invention, is the combination of a bed of rollers, moving at different velocities, with a compressor, for the purpose of washing, rinsing, and wringing clothes, substantially as set forth."

10. For an *Improved Blind and Shutter Mover and Fastener;* William Maguire, Cincinnati, Ohio, January 1.

The patentee says,—"The nature of my invention consists in constructing the usual window blind opener and fastener, where a cog wheel on the hinge is operated by a similar wheel on a shaft passing through the window frame to the inside of the house, so that, by means of a finger on the last mentioned wheel, a gravitating catch, placed at a proper position on the outer face of the blind for resisting the wind or other agency, can be positively fastened and unfastened, the finger being operated by the handle that turns the shaft inside of the house, the handle, and a spring catch inserted therein, comprising at the same time within themselves, and in connexion with a curved rack, a strong yet neat mode of fixing the position of the blind when the gravitating catch is not called into play, the end of the handle being made to clasp the edge of the rack forward into one or other of the notches on the face of the curved rack."

Claim.—"What I claim as new, is the combination of the finger and wheels with the gravitating catch, its recess, and spring and hook, for moving, fastening, and unfastening the blind."

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11. For *Improvements in the Wheel and Axle Stump Extractor;* John Rogers, Orleans county, Vermont, January 1.

The patentee says,—"The nature of my invention consists in an arrangement, or peculiar manner of arranging, of the axletree of the wheels with respect to that of the windlass barrel, the object of the same being to relieve the journals of the axletree of the wheels from much, if not all, the strain to which they are usually subjected when the machine is used, and they are placed or arranged in line with the axis of the barrel or windlass, as they have heretofore been disposed; it being understood that in such machines as hereinbefore constructed, instead of the windlass barrel having an axletree entirely separate and distinct from that of the wheels, but one axle was generally employed, and that common to both barrel and wheels."

Claim.—"What I claim as my invention, is the arrangement and combination of the axle or journals of the wheels and the axle or journals of the windlass barrel of a stump extracting machine, substantially in the manner, and with respect to the bed-frame and other parts of the machine, as hereinbefore specified; the same being for the purpose essentially as above set forth."

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12. For an *Improvement in Machinery for Making Cotton Cordage;* Franklin Slaughter and David Perry, Fredericksburgh, Spotsylvania county, Virginia, January 1.

Claim.—"What we claim as our invention, is, 1st, the improved form of the nipper-heads, when the nippers are combined therewith by means of the steadying pins, projecting from the inner edge of the nippers into guiding holes in the nipper-heads, and by suitable actuating springs, or their equivalents, substantially as described; by means of which the nippers are prevented from becoming clogged in their movements, and from pressing against the slivers, by the accumulation of trashy matter about them.

"2d, In combination with the planetary motion of the series of flyers that receive and twist the cotton slivers, and lay the threads formed thereby into a cord or rope, as described, we claim the independently-moving and self-adjusting compressing forming block, for giving a round and perfect form to the cord or rope, after its component threads have been laid together, substantially in the manner herein set forth."

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13. For an *Improvement in Branding Tools;* Lewis Stark, Chicopee, Hampden county, Massachusetts, January 1.

Claim.—"I claim as my invention, the combination of the inner with the outer shell, substantially in the manner described, as applied to the branding tool."

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14. For an *Improvement in Printers' Type Cases;* John Bell, Harlaem, New York county, New York, January 8.

The patentee says,—"My improvement consists in grooving the bottoms of cases for the reception of the lower parts of the partitions, and glueing these in them; thus giving each recess a tight bottom, one always in contact with it, rendering the entire case more compact and durable, and effectually preventing the escape of the thinnest leads or letters from their places."

Claim.—"I confine my claim to grooving the bottoms of type cases for the reception of

the lower edges of the partitions, and to securing these in them by glue, in the manner herein set forth, or of modes substantially the same."

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15. For *Improvements in Engines Operated by Steam and Water;* James Black, Philadelphia, Pennsylvania, January 8; anté dated November 19, 1849.

Claim.—"What I claim as my invention, is the manner of combining steam and air for the purpose of giving motive power to the wheel, consisting in a jet of the former being thrown from the nozzle of the pipe C, into the pipe F, simultaneously introducing therein a quantity of the latter, which together are discharged through the lower end of said pipe F into the buckets of the wheel, and, displacing the water therein, causing said wheel to revolve, in combination with G, through which the hot air is drawn from the top of the box or reservoir into the pipe F, and re-introduced with the steam into the box at its bottom, thus using it repeatedly over again. The apparatus by means of which the above is accomplished is constructed and arranged substantially in the manner described."

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16. For an *Improvement in Grain Drills;* William Bullock, Philadelphia, Pennsylvania, January 8; anté dated October 29, 1849.

The patentee says,—"The nature of my invention consists in its self-regulating principles, by which it clears the teeth from straw and other fibrous substances, and by which each tooth is made to rise and fall with the surface of the ground, and by which principles the simple action of the team, in hauling the drill, will allow any of the teeth to pass over any permanent obstructions which may be concealed under the ground, and bring the said teeth to their proper places immediately on their passing the said obstructions."

Claim.—"What I claim as new, is, 1st, the rollers which serve to clear the teeth from rubbish and govern the depth of the teeth.

"2d, The spring, in combination with the sheaves and teeth, by which arrangement the whole or a part of the teeth can be held by a spring of the same power and range of movement that it would require for a single tooth.

"3d, The movable bar to which the team is attached, in combination with the mode of hanging the teeth by means of sheaves or other similar device, by which arrangement the teeth will pass over obstructions, in which the action of the team in hauling the drill or cultivator will bring the teeth forward to their proper places as soon as they pass over the obstructions; and

"4th, The feeding band, substantially in the manner and for the purpose set forth."

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17. For an *Improvement in Cultivators;* Ashley Crafts and Ebenezer Weeks, Auburn, Geauga county, Ohio, January 8.

Claim.—"What we claim, is the combination of the levers, roller, and driving wheel, in the manner and for the purpose set forth."

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18. For an *Improvement in Cotton Gins;* John Du Bois, Greensboro', Greene county, Alabama, January 8.

The patentee says,—"The nature of my invention consists in providing an auxiliary set of ribs, between which the saws pass twice after passing through the ribs in the roll-box, to separate motes, &c., from the cotton in a separate chamber from that in which the seeds are separated from the cotton."

Claim.—"I claim the back ribs in combination with the front ribs, they (the back ribs) being constructed with a horn or projection each, behind which they curve downwards, to allow the saws to pass twice between the ribs, to remove the motes and other impurities, in the manner substantially as described."

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19. For an *Improvement in Car Wheels;* George W. Eddy, Waterford, Saratoga county, New York, January 8.

The patentee says,—"The principle or character of my invention consists in combining with a cast iron solid hub and chilled cast iron rim, connected by a plate or plates, either cast in one substance with the hub and rim, or otherwise secured thereto, a set or sets of metal bars or spokes, secured in place either by casting the hub and rim thereon, or otherwise secured to them, for the purpose of giving additional strength to the wheel, and preventing the hub from separating from the rim when the plate or plates break, and thereby avoiding many of the disasters so frequent on railroads."

Claim.—"What I claim as my invention in railroad car wheels, is the combination of the rods which connect the hub and rim with the plate or plates, which also unite the hub and rim, substantially as herein described, whereby the plate or plates are protected against fracture from any sudden jar, and the hub prevented from being separated from the rim should the plate or plates break, as described."

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20. For an *Improvement in Smut Machines;* Joseph G. Goshon, Shirleysburgh, Huntingdon county, Pennsylvania, January 8.

Claim.—"What I claim as my invention, is constructing the shoe (having the perforated plate for separating large extraneous matter from the grain) with a screen for separating the cockle and cheat from the grain, and an imperforated plate and spout for conducting the same to the outside of the machine, as described."

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21. For an *Improvement in Curing Tobacco Stems;* Thomas Hoyt, City of New York, January 8.

Claim.—"What I claim as my invention, is the process of curing stems or other parts of tobacco with charcoal, by combining or mixing the two together, substantially in the manner and for the purpose set forth."

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22. For an *Improved Ore Washer;* William M. Hughes, Fayette, Howard county, Missouri, January 8.

Claim.—"What I claim as my invention, is separating substances differing in specific gravity, or washing metallic ores, by means of oblique currents of water, and a horizontal one passing over the same in a reverse direction, substantially in the manner described; the oblique currents being produced by inclined surfaces or their equivalents."

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23. For a *Method of Counterbalancing Sash by Means of a Heavy Weight;* Wm. Maguire, Cincinnati, Ohio, January 8.

The patentee says,—"The nature of my invention consists in attaching to each side of the sash a metallic rack into which a pinion wheel works, the pinion being placed within the window frame at about the height that allows it to catch in the teeth of the rack on the sash when the sash is flush down. Back of said pinion, and within the window frame, another rack works also into the pinion, the said rack being the exact length of the rack on the sash, and, in weight, half the weight of the sash."

Claim.—"What I claim as new, is counterbalancing the sash (and consequently enabling it to be suspended at any desired point) by means of metallic racks within the window frame, these racks being operated by pinions rotating on fixed shafts within the window frame, and these pinions being driven by other racks attached to the sides of the sashes throughout the entire length; the whole being constructed and arranged in the manner and for the purpose set forth."

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24. For an *Improvement in Connecting Cutters to Shafts of Boring Instruments;* Lewis W. Miller, Mesopotamia, Trumbull county, Ohio, January 8.

Claim.—"What I claim as new, is the fastening by which the knives are affixed to the mandril, being a keyed ring to sustain the shank of the knives firmly in adjusting slots in the mandril, substantially as is above described."

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25. For an *Improvement in Coating Iron with Copper or its Alloy;* Ebenezer G. Pomeroy, St. Louis, Missouri, January 8; anté dated July 9, 1849.

Claim.—"What I claim as my invention or discovery, is, 1st, the before described process of coating and impregnating iron, in all useful shapes and forms, with copper or any alloy of which copper forms a part; the said process consisting of cleansing with sulphuric acid, defending the cleansed surface with a coating of clay or other aluminous earth, drying the same, and then plunging the article thus coated into melted copper or some alloy of that metal.

"2d, I also claim the use of the clay paste to protect the metal from oxidating, during the process of alloying or coating the metal plates or pieces of iron, as set forth."

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26. For an *Improvement in Churns;* Z. C. Robbins, St. Louis, Missouri, January 8.

Claim.—"What I claim as my invention, is the placing the inner surfaces of the series of

outer blades in positions tangential, or nearly so, to their circle of rotation, when they are combined with the inclined inner series of blades, substantially in the manner and for the purpose as set forth."

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27. For *Improvements in Machinery for Making Cotton Cordage;* Franklin Slaughter and David Perry, Fredericksburg, Spotsylvania county, Virginia, January 8.

Claim.—"What we claim as our invention, is constructing the nipper springs of parallel bars, (one or both of which may be made elastic,) having series of holes or slots formed in them for the reception of the connecting and adjusting screw bolts, for the purpose of enabling us to cause the several nippers to press with the same amount of power and elasticity upon the slivers during their passage through the nipper heads, and also to vary the elasticity of the springs as circumstances may require, substantially as set forth."

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28. For an *Improvement in Alloys for Points of Lightning Rods;* James Spratt, Cincinnati, Ohio, January 8.

The patentee says,—"The nature of my invention consists in forming an alloy of the metals, &c., in the following proportions, namely: I fuse together, 60 lbs. of English block tin, 5 lbs. of oxide of tin, 14 lbs. of antimony, 14 oz. of bismuth, 8 oz. of refined silver, 2 oz. of platinum, and as much silex as the metals will take up."

Claim.—"What I claim as my invention, is the formation of an alloy composed of English block tin, oxide of tin, antimony, bismuth, refined silver, platinum, and silex, in proportions as shown in the above specification, and for the purposes of being manufactured into lightning rod points."

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29. For *Improvements in Machinery for Dressing Shingles;* Augustus Welch and Robert Walker, Bennington, Indiana, January 8.

The patentees say,—"The nature of our invention consists in so arranging the several parts of the machine that the bolt shall be riven, and the slab shaved on both sides at once, and delivered in a finished state."

Claim.—"What we claim as new, is, 1st, the combination of two planes, guided and moving to and fro in the straight converging grooves, with the spring plates in front of the plane-irons, for holding the slab, and those behind the plane-irons, for discharging the finished shingle from the machine; the whole being arranged and operating as set forth."

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30. For an *Improvement in Machines for Cutting Shingles;* William Wood, Westport, Fairfield county, Connecticut, January 8.

The patentee says,—"The nature of this invention consists in securing the block of wood, from which the shingles are to be cut, to a vibrating carriage, arranged on suitable ways immediately in front of an inclined sliding frame containing a knife, and causing said carriage, with the block, to be drawn toward the knife, and vibrated at each up and down movement of the knife, by means of springs, notched bar, cams, and other appendages, in such a manner as to cause the carriage to vibrate and adjust the wood in such relation to the knife as to cut a tapered shingle at each downward movement of said knife."

Claim.—"What I claim as my invention, is the mode of moving the carriage sideways, and forcing the same towards the knife alternately, by means of the cams moving over the grooved shaft, by means of the bar and groove operating on the curved bars, cams, inclined bars, bolts arranged in the tubes, and pressed against the notches of the slotted bars by the spiral springs; spring L; the whole arranged and operated substantially in the manner and for the purpose set forth."

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31. For an *Improvement in Mills for Sawing Irregular Forms;* Oliver Wright, Rochester, New York, January 8.

The patentee says,—"The nature of this invention consists in securing the saw in an inclined sliding frame, and arranging at the lower part of the same a vibrating table or platform, having segmental plates or bars secured to its lower surface by screws passing through slots formed in the same, the lower edges of which plates or bars rest on friction rollers turning in the frame of the machine, over which they are moved by a combination of bevel cog wheels, screw and other shafts, bands and pulleys, in such a manner as to cause the surface of the table or platform to assume any required angle with the line on which the saw moves, in order to give a corresponding bevel or mitre to the timber being sawed, and to admit of the

table being raised or lowered on the segmental plates or bars, to accommodate itself to any thickness of timber, so as to always keep the centre, of which the segmental plates or bars form the arcs of circles, on a line with the line upon which the saw moves, and midway between the upper and lower surfaces of the timber being sawed, to prevent the saw binding on its sides."

Claim.—"I claim the mode of raising and lowering the table or platform on the segmental plates or bars, for adapting the same to any thickness of timber to be cut, and keeping the middle of the timber, between its top and bottom, always in a line with the centre of which the segmental plates or bars form arcs of circles, through which (the centre) the saw passes, to prevent it from bending in the timber when sawing a curvilinear surface, by means of the ribs having slots near their ends, through which the screws, which enter the segmental plates or bars, pass in the manner herein described."

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32. For an *Improvement in Mowing Machines;* Homer Adkins, Round Prairie, McDonough county, Illinois, January 15.

The patentee says,—"The nature of my invention consists, 1st, in providing one wheel of the wagon with cogs on its face, and combining it with a rocking shaft, on which are placed two cams, arranged in such a manner with the cogs of the master wheel that, when the said wheel revolves, one cog will act upon the cam on the rocking shaft at one side downwards, and another on the other side upwards, and this alternately to move the shaft in a rocking manner, to give a reciprocating motion to whatever machinery it be connected with.

"2d, I provide two sets of what may be termed cutters, consisting of two blades like two large saws, the same arranged one above the other, the lower made fast and the upper one attached to the rocking shaft connected with the master wheel of the wagon or cart, whereby the upper blade or set of cutters receives a reciprocating motion across the front of the cart below, cutting the grass, which is held snugly to receive the cut of the same, by the blade below, which, like fingers, grasp the grass for that purpose."

Claim.—"I claim the master wheel, constructed with cogs on its face, in combination with the rocking shaft, constructed with two knobs or projections on it, to give a rocking motion to the said shaft, in the manner substantially as described."

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33. For *Improvements in Gates for Fences;* Jesse Bailey, Leatherwood, Guernsey county, Ohio, January 15.

The patentee says,—"My invention consists in balancing the weight of the gate by the weight of panel of fence attached to the gate post."

Claim.—"What I claim as my invention, is the method of balancing and adjusting gates by the panel of fence secured to the gate post, substantially as herein set forth."

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34. For an *Improvement in Folding Bedsteads;* John Binder, Chelsea, Suffolk county, Massachusetts, January 15.

Claim.—"What I claim as my invention, is arranging said centre joint with the centre rivet below the other two, in combination with the curving of the adjacent edges of the parts of the side bars, so as to rest upon said centre rivet as described; and also the forming of the inner connecting bar with lateral projections or shoulders, which, when the bedstead is open, shall rest on the top of the cross-bars of the bedstead adjacent to the joints in the side bars of the same, all as set forth."

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35. For an *Improvement in Dampers for Cleaning Stove Pipes, and Regulating the Draft in the Same;* Frederick Bleier, Pittsburgh, Pennsylvania, January 15.

Claim.—"What I claim as my invention, is the scraper, with the rods attached in such manner that it may be used for the purpose of cleaning the stove pipe, and also to act as a damper, as set forth."

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36. For an *Improvement in Mills for Grinding;* Charles W. Brown, Boston, Massachusetts, January 15.

The patentee says,—"The first part of my invention consists in constituting the mill spindle one arm of a universal joint, the other arm of the said joint being pivoted to the runner, so that the runner has free play to adapt itself to the grinding surface of the stationary stone.

"The second part of my invention consists in employing a sliding tube between the bush

of the stationary stone and the spindle, the upper end of the said tube being fitted to the under surface of a collar on the spindle, and the lower end resting on a secondary bridge-tree which moves with the main bridge-tree, so that the tube shall move up and down with the spindle when the runner is adjusted, the lower or second bridge-tree being adjustable relatively to the main bridge-tree, that the two may be adjusted to the collar of the spindle, to prevent the passage of meal, &c., into the tube."

Claim.—"I claim the employment of a sliding adjustable tube within, and in combination with, the bush of the stationary stone and the spindle, for the purpose and in the manner substantially as described."

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37. For an *Improvement in Brick Presses;* Charles Carnell, Kensington, Philadelphia county, Pennsylvania, January 15.

Claim.—"What I claim as new, is, 1st, the arrangement of levers B and C, by which arrangement the bearing of C is near the fulcrum of B, thereby giving the operator power to start the brick out of the mould, and by which arrangement the motion of the piston is increased by the bearing of C on B."

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38. For an *Improvement in Files for Keeping Papers;* Edwin D. Dood, Cincinnati, Ohio, January 15.

Claim.—"What I claim therein as new, is the top, consisting of a stationary part for about half its length, and a lid hinged thereto for the remainder, in conjunction with the end lid and one or more side openings, substantially after the manner and for the purposes described, namely, that of combining with sufficient facility of reference, the greatest attainable despatch in the abstraction and insertion of papers, and moreover constituting, when closed, a secure and portable paper-holder."

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39. For an *Improvement in Obstetrical Supporters;* William W. Finch, Jacob Blaisdell, and Leander Babbit, Essex county, New York, January 15.

The patentees say,—"The nature of our invention consists in combining and arranging certain appendages in such a manner that the female is enabled to apply the necessary pressure to the back by the compound simultaneous action of certain straps and braces connected with the spinal pad, by which much of the delay and danger of parturition is removed, and the intensity of the irritation and pain alleviated, without the agency of assistants; the whole acting in an easy and natural manner, creating the pressure through the effort of the upper and lower extremities of the female, thus hastening the termination of labor, and rendering the process of delivery much more safe and easy than by any other means or instruments heretofore used."

Claim.—"What we claim as new, is, 1st, the combination of the back supporter, feet straps, and adjustive shoulder braces, constructed as described, with the back pad, by which the female is enabled to apply the necessary pressure to the back by the simultaneous or alternate action of the shoulders and feet on the straps connected with the back pad, for relieving the labor and irritation of parturition without the assistance of any other person, as herein fully set forth."

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40. For an *Improvement in Harvesting Machines;* John E. Heath, Warren, Trumbull county, Ohio, January 15.

The patentee says,—"My invention consists, first, in so arranging the cutters, which in my machine act as shear blades, that they can be set closer to each other as they wear; and second, in the peculiar motion given to them by which they are freed from the gum and dirt which accumulate upon their blades."

Claim.—"What I claim as my invention, is the method of cleansing the cutters, by giving them at suitable intervals a larger vibration than ordinary, substantially in the manner herein set forth, thus detaching the dirt and gum which accumulates upon them."

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41. For a *Substitute for the Clevis;* John Howell, William D. Howell, and John Sipe, Clark county, Ohio, January 15.

The patentees say,—"The nature of our invention consists in having the upper part of the sheath or upright in the form of a crown-head, with a mortise through its whole length at right angles to the beam, which mortise has on each side, at the lower part, a groove running through it. Through this mortise, and through the beam, there passes a bolt, the head

of which is made to fit these grooves, and slide from side to side in the mortise. By this bolt there are two motions given to the beam, the one horizontal, the other perpendicular."

Claim.—"What we claim as our invention, is the combination of the crown-head and bolt with the upright, by which the plough is made to cut any width and depth desired, made substantially as herein described."

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42. For an *Improvement in Cider Mills;* Samuel Jackson, Hamilton, Butler county, Ohio, January 15.

Claim.—"What I claim as my invention, is the particular combination of machinery used for the purpose of grinding and pressing fruits and juicy substances, viz., 1st, the cutter-drum, with its teeth *a* running into teeth *b*, in bed-mould, used to grind the fruit or juicy substance.

"2d, The strap made of felting, hair cloth, or other porous substance, used to carry the pommace or ground substance between the pressing drums, where it is pressed, and to strain the juice thus expressed.

"3d, The press-drums, used to press the juice from the pommace or ground substance.

"4th, The brush, used to remove the pommace or ground substance from the strap; all of the above being performed by one application of power and continued rotary motion."

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43. For an *Improved Arrangement of the Valves of Hydraulic Engines;* Cornelius S. Van Wagoner, assignee of Wm. Kennish, Paterson, Passaic county, New Jersey, January 15.

Claim.—"What I claim as my invention, is arranging four register valves upon one spindle, in such a manner with reference to each other and their seats, so that the pressure upon any one of them shall be counterbalanced by the pressure upon some other of them, substantially in the manner herein described, for the purpose of regulating the induction and eduction to and from hydraulic engines."

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44. For an *Improvement in Machinery for Tongueing and Grooving;* Robert Kittle, Dansville, Livingston county, New York, January 15.

The patentee says,—"My first improvement consists in the method of holding the plank firmly and securely upon the bed-plate while it is being operated upon by the planing cutters.

"My second improvement consists in the manner of arranging the tongueing and grooving cutters in their respective cutter-heads, in combination with the manner of operating them."

Claim.—"What I claim as my invention, is the placing the finishing, grooving, and tongueing cutters in the same heads with the primary grooving and tongueing cutters, and in reversed positions thereto, when the said cutter-heads are connected to operating cranks at one end, and are jointed to working levers at points between the primary grooving and togueing cutters and the finishers, substantially as described, for the purpose of giving to the said cutters the movement and action set forth."

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45. For an *Improvement in Buckles;* George R. Kelsey, Middletown, Middlesex county, Connecticut, January 15.

The patentee says,—"My method consists in making buckles entire from sheet metal of any kind suitable for making buckles."

Claim.—"What I claim as my improvement, is the mode of making buckles entire from a single piece of sheet metal, as described; the buckle opening and shutting by means of the spring given to it in the construction thereof, as aforesaid."

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46. For an *Improved Door Lock;* William Maguire, Cincinnati, Ohio, January 15.

The patentee says,—"The nature of my invention consists in making the usual central protuberance, on the face of the knob, a spring trap for concealing the entrance for the key; and in making the spindle semi-cylindrical, and providing it with an annular bearing collar by which to hold on the knob, and providing it with a spring lever with a catch, which, when allowed to drop into a cavity made on the shank end of the knob, enables the knob to turn the spindle, or, in other words, prevents the knob rotating without turning the spindle; and providing it also with an inclined plane across its concave, by which the key is bent and guided towards the tumbler, the spindle thus forming a trough along which the key is pushed home.

"I also effect action on the bolt by means of a key capable of being straightened like a bar, and passed through the cylindrical opening in the knob, and along the cavity in the spindle,

(thus making but one opening into the lock,) and having its bit guided by the inclined plane on the spindle, and by another inclined plane on a disk in the lock, so as to introduce the bit into the notch in the compound tumbler and lever, and thus operate the bolt. I also effect the same by gearing within the body of the key, when I forego the use of one or both of the aforementioned guides.

"I also enable the key to operate the compound tumbler and lever, by previously compelling it to operate a bent lever, that, pressed towards the centre of the lock, lifts out of the way a spring tumbler, that controls the compound tumbler and lever, before the bit of the key enters the notch in the compound lever and tumbler, by lifting which the key retracts the bolt.

"I also prevent, by the foregoing arrangement, the retraction of the latch until the bolt is withdrawn.

"I also prevent the spring lever in the spindle from pressing the catch on said lever, (and effect this by means of the cam on the compound lever and tumbler,) until the bolt is retracted by the action of the key on the said compound lever and tumbler, so that, until the bolt is withdrawn, the knob rotates on the spindle."

Claim.—"What I claim as new, is, 1st, the combination of parts forming the key, constructed substantially as described, viz., the shaft with its slot, the slide with its slots, pins, rack, jaws, pinion, and bit with its teeth.

"2d, Constructing the knob with a central opening in its face closed by a spring disk, for the purpose of introducing there through the semi-cylindrical spindle with its annular shoulder a key, such as aforeclaimed, the shank of the knob being hollow for the purpose of receiving the same.

"3d, Arranging the bent lever that lifts the spring tumbler, so that the key must operate this lever before it can be inserted into the notch of the compound lever and tumbler for lifting the same, substantially in the manner described.

"4th, Constructing the compound lever and tumbler with the following characteristics, viz., so that its projection, in combination with the spring lever, prevents the bolt being forced back by pressure on its face when the bolt has been thrown forward; so that its projection, in combination with the projection on the latch, prevents the retraction of the same when the bolt is thrown forward; and so that its cam prevents the spring in the spindle from throwing the catch on the other end of the lever into the cavity on the face of the shank of the knob, so long as the bolt is thrown forward; the knob being thereby permitted to rotate on the spindle when the bolt is thrown forward, and to rotate with the spindle when, by the elevation of the compound lever and tumbler, the cam is carried below the lever; the compound lever and tumbler being thus combined with the spring tumbler, the bolt, the latch, the spindle, through its lever, and the knob, substantially in the manner and for the purposes described."

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47. For an *Improvement in Circular Saw Mills;* Nicholas G. Norcross, Lowell, Massachusetts, January 15.

The patentee says,—"The nature of my invention consists in suspending the saw so that it can have a lateral vibration, and, when thrown out of line, will recover itself by the action of the driving belt, and the arrangement of the parts by which it is sustained, while at the same time the arbor has no lateral play in its boxes, and is made to fit close with shoulders, to prevent the oil from getting out while in operation, a matter of great importance when the motion is rapid, as in circular saws. This is effected by supporting the boxes in which the journals of the arbor run, upon standards to which said boxes are jointed, and which are themselves jointed to the foundation to which they are attached, so that the arbor is kept horizontal while it is allowed sufficient lateral play, the motion being in a curved line, and of course inclining downward, as the tops of the standards recede either way from a vertical position; to sustain this frame upright, the driving belt passes around the pulley on the arbor, up over a driving pulley above, and thus holds the frame up to the proper point, so that the saw is actually suspended by the belt, while it is kept steady and made to run properly by the frame below. By this arrangement, it will be seen that, while the slightest force will cause the arbor to deviate a little laterally, the constant tendency of the reacting agent is to bring it back to place again; by this means I am enabled to use a much thinner saw, and save material and power to a great degree."

Claim.—"What I claim as my invention, is the application to circular saw frames of rocker-boxes and a swing-frame, as herein set forth, and suspending said frame in position by means of the driving belt, as above described, for the free and successful operation of the saw by the motion before mentioned."

48. For *Improvements in Spindles and Bobbins for Spinning;* Josiah G. Reed, Paterson, Passaic county, New Jersey, January 15.

Claim.—"What I claim as my invention, is making the life spindle or bobbin tube with two conical shoulders, substantially as described, in combination with the conical supports in which they run, one or both ends being adjustable, substantially as described.

"And finally, I claim the method, substantially as described, of driving the life spindle by means of a warve tube running on a dead spindle or a step, and embracing the lower end of the spindle, substantially as described."

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49. For *Improvements in Winnowing Machines;* Abraham Straub, Milton, Northumberland county, Pennsylvania, January 15.

The patentee says,—"The most important of these improvements consists, first, in delivering the threshings or foul grain to the blast in a direction the reverse of that in which the latter is moving; and second, in the peculiar method of distributing the blast generated by the fan."

Claim.—"What I claim as new, is the combination of a series of wind passages with the separating chamber, or other device for presenting the foul grain to the action of the blast, and a fan for producing the blast, substantially as set forth."

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50. For an *Improvement in Fastenings for Harness Hames;* Mortimer Taylor, of near Govanstown, Baltimore county, Maryland, assignee of Timothy Taylor, Purcell's Store, Loudon county, Virginia, January 15.

Claim.—"What I claim as my invention, is the combination of the hook lever and metallic plate secured to the lower end of one of the hames, for tightening the connecting strap attached to the lower end of the fellow hame, and for the purpose fully set forth, by which the hames may be connected and disconnected instantaneously by simply moving the hook lever in the arc of a circle; thus doing away with the troublesome and insecure fastening usually employed to connect the lower ends of hames."

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51. For an *Improvement in Boring Machines;* Andrew Weikart, Greenford, Mahoning county, Ohio, January 15.

The patentee says,—"The nature of this invention consists in the construction of an implement or tool to be applied to the sides of beams of timber or other articles to be bored, said implement or tool being adjusted and clamped in the position desired to bore, the auger being at right angles to the face of the article being bored, and provided with a crank by which it is turned."

Claim.—"What I claim as my invention, is the combination of the jointed hook lever, pawl, notched plate, perforated flanched plate, crane, adjustive clamping block, with the adjustive stock, for adjusting and confining the bearings of the boring tool to the timber to be bored, in any desired position for boring holes in the timber at any required angle, without moving the timber, as described."

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52. For an *Improvement in Trusses for Hernia;* William R. Battle, Powelton, Hancock county, Georgia, January 22.

Claim.—"What I claim as my invention, is the peculiar bend of the elliptical springs, as described, so as to cross them in front, and make the spring on one side support the opposite side, thereby giving a better pressure, with more ease and comfort to the wearer."

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53. For a *Candle Mould Apparatus;* Herman Camp, Dunkirk, Chatauque county, New York, January 22.

Claim.—"What I claim as my invention, is, 1st, the before described mode of making candles, by using the candles previously drawn from the moulds to hold the wicks for the succeeding candles, in the centres of the moulds, until the latter become sufficiently hard to sustain their own wicks, as described.

"2d, I claim the combination of the frames F K, recessed candle-holders, frames M M, and spools containing the continuous wicks, with the candle moulds, as described.

"3d, I claim the employment of the revolving platform, in combination with the hinged moulds constructed as aforesaid, arranged and operated in the manner and for the purpose as set forth.

"4th, I also claim the manner of raising the outer end of the spout of the vat, simultaneously with lowering the gate, for the purpose of stopping the dripping of the tallow whilst turning the frame of moulds, by combining the spout with the gate by the stirrup, roller, and lever, as described."

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54. For an *Improvement in Gearing and Ungearing Seeding Apparatus;* David Eberly, Strasburg, Lancaster county, Pennsylvania, January 22.

Claim.—"What I claim as my invention, are the devices used herein for gearing and ungearing the seeding apparatus, as described."

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55. For an *Improvement in Bedstead Fastenings;* Matthew Elder, Mansfield, Richland county, Ohio, January 22.

The patentee says,—"My invention consists in giving such forms to the respective portions of the fasteners that they can be secured to the posts and rails of a bedstead, without making a mortise in either the one or the other."

Claim.—"What I claim as my invention, is the giving the portion D of the fastener, that is secured to the ends of a rail, a tubular shape, and such a size that the portion thereof that projects from the end of a rail will embrace the fastening plate that is secured to the side of a post, when this arrangement is combined with the lugs projecting inwards from the extremity of D, and the notches and inclined planes on the plate A, substantially as set forth, by means of which the respective parts, A D, of the bedstead fastener can be secured to the posts and rails of a bedstead without forming a mortise in either one or the other."

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56. For an *Improvement in the Concave of Corn Shellers;* Daniel Hoats, Milton, Northumberland county, Pennsylvania, January 22.

The patentee says,—"My invention consists, first, in making the concave in segments, hinged together and separately adjustable to different distances from the cylinder, to adapt the machine to the shelling of different kinds of corn; second, in so connecting the staves of both sides of the concave that, when adjusted, they shall be simultaneously moved an equal distance towards or from the cylinder, while at the same time their relative distance therefrom shall remain unchanged; and third, in combining with the grate or coarse screen for separating the grains of corn from the cobs, a series of punches or teeth, which, when the grate (which has a vertical oscillation) descends, will protrude through its meshes and free them from pieces of cobs and other obstructions; this arrangement ensures a constant and effectual separation of the corn and cobs."

Claim.—"What I claim as my invention, is, 1st, connecting the opposite sides of the concave, substantially as herein described, whereby they may be moved simultaneously towards or from the cylinder without changing their relative distances from the same.

"2d, I claim the combination of the screen or grate with the punches for freeing its meshes from obstructions, substantially as described."

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57. For an *Improvement in the Gridiron Slide Valve;* William W. Hubbard, Boston, Massachusetts, January 22.

Claim.—"What I claim as my invention, is the peculiar arrangement of the exhaust mortises or spaces in the sliding valve, between and around the inducting and educting passages through said valve, in combination with the elongated side slots or passages through the valve seat, leading to the exhaust chamber; the whole arrangement and operation being substantially as set forth."

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58. For an *Improved Tuyere;* John Pawling, Morgantown, Berks county, Pennsylvania, January 22.

Claim.—"What I claim as new, is placing within a chamber, having numerous apertures at the top and a discharge valve at the bottom, an upright pipe open at both ends in the manner described, whereby a blast of the greatest intensity is delivered at the centre of the fire, and the vertical pipe may be readily freed from ashes, cinders, &c."

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59. For an *Improvement in Portable Furnaces;* Merritt F. Porter, Charlemont, Franklin county, Massachusetts, January 22.

Claim.—"I claim the mode described of constructing my portable furnace, viz., with a di-

ving flue, open at the bottom so as to adapt it readily for use to the boiler holes of cooking stoves, in the manner specified."

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60. For *Improvements in Spark Arresters;* James Radley and John W. Hunter, City of New York, January 22.

Claim.—"What we claim as our invention, is, 1st, the arranging of a series of chambers and channels between two conically shaped plates, the channels being so formed as to cause the products of combustion to impinge against that side of each of the dirt chambers which has the openings and caps, and thereby force the sparks, dirt, &c., into them in the manner described herein.

"We also claim the combination of the double conical cap or cover, for the formation of the second series of dirt chambers, with the pipe; the whole being combined and operating substantially as described."

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61. For an *Improvement in Cases for Daguerreotype Pictures;* Ann F. Styles, Southbury, New Haven county, Connecticut, January 22.

The patentee says,—"The nature of my invention consists in the manufacture of a glass tube or case, in which the picture can be coveniently secured and seen through a magnifying lens, and at the same time protected from dust and interfering reflections from other objects."

Claim.—"What I claim as my invention, is the new manufacture of Daguerreotype cases, to wit, securing the picture in a glass tube or case provided with a magnifying lens, said tube being blackened on part of its inner surface, and admitting the light through another part to the plate, in the manner described."

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62. For a *Chain and Flanch Apparatus for Opening and Closing Window Shutters;* Geo. Welsh, City of Washington, D. C., January 22.

Claim.—"What I claim as my invention, is the combination of links and a centre nut with a stationary curved flanch, exterior to the chain, to guide the links in such manner that they may be operated to turn the centre pulley or nut either by pushing or pulling, as herein described.

"I also claim, in combination with the sliding bar and links herein described, the arm on the centre nut, and the notch on the bar, for locking the shutter and taking the pressure off of the links when the bar is pushed in, and the shutter fastened as described."

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63. For an *Improvement in Preparing Illuminating Gases;* Stephen White, Manchester, England, January 22; anté dated March 26, 1849.

The patentee says,—"My improvements in the manufacture of gas for illumination, and in apparatus employed therein, consist, 1st, in decomposing water by bringing it into contact, in the manner described, with charcoal, coke, or anthracite coal, and small thin plates of iron or small pieces of iron turnings or iron wires, at a high temperature, and thereby producing from such combination of materials, so treated, hydrogen gas, oxide of carbon gas, and carburetted hydrogen gas mixed, and afterwards in combining such compound gas with such carburetted hydrogen gas as may contain a large proportion of olefiant gas, produced by burning oil, or fat, or resin, or certain other substances hereinafter designated or described, in contact with heated materials, or with carburetted hydrogen produced from certain kinds of pit coal, so as to produce ultimately a compound gas, composed of hydrogen gas, oxide of carbon gas, and carburetted hydrogen gas mixed together; which compound gas is fitted for the purpose of illumination; and

"2d, My said invention consists, so far as it relates to the apparatus used, in certain particular apparatus hereinafter described, in reference to the plan or drawing hereto annexed."

Claim.—"I claim the method which I have described of producing hydrogen gas, oxide of carbon gas, and light carburetted hydrogen gas combined, freed, or nearly freed, from the presence of carbonic acid gas, by passing the gas evolved by the decomposition of water through a mass of materials consisting of charcoal, coke, or anthracite coal, in combination with thin iron plates, or iron wires, or iron turnings, heated to a high temperature; such compound gas, produced as aforesaid, being combined with heavy carburetted hydrogen gas produced by the decomposition of resin, oil, fat, or pit coal, or such other substances as herein before designated or described.

"I claim the use of small chains, or other similarly connected pieces of metal, as a means of presenting a large amount of iron surface, for the purpose of decomposing the resin, tar, oil, or fats, or other such substances herein before designated, such chains or other similarly

united pieces of metal being so arranged as to expose the vapors disengaged from the above mentioned substances to a multitude of small divided and heated surfaces."

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64. For an *Improvement in Seed Planters;* William B. Willis, Charlestown, Jefferson county, Virginia, January 22.

The patentee says,—"The essential improvement I have made in the machine relates to the construction and arrangement of the supporting and propelling wheels, which have their peripheries made with circular flanches, for the purpose of confining the seed to the peripheries of the wheels, and preventing the clods falling into the furrow made by the plough; pulling off any vegetation, such as roots of clover, straw, weeds, and other substances that may collect around the helve at its connexion with the shovel; gathering the fine earth to cover the seed, the peripheries of the wheels between the flanches serving as rollers to roll in the seed, and as bearings or fulcra, whilst bearing upon the handles at the rear end of the frame, to raise the fore end to turn the same to the right or to the left; rendering the machine perfectly manageable to the seed man, and enabling him to pass it over roots and through cloddy land, and having the capacity to cut its own way through the clods and roots."

Claim.—"I only claim as my invention, the employment of the flanched, supporting, conveying, cleaning, and covering wheels, made as described, in combination with the rest of the machine, when made in the manner as set forth, for planting cotton and other seeds, and for other purposes."

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65. For an *Improvement in Chucks for Boring and Mortising Machines;* Eli K. Wisell, Warren, Trumbull county, Ohio, January 22.

Claim.—"What I claim in the before described machine for mortising and tenoning as my invention, is the self-centreing chuck, constructed substantially as set forth."

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66. For an *Improvement in Atmospheric Churns;* John Young, West Galway, Fulton county, New York, January 22.

The patentee says,—"My invention consists in so constructing the dasher that, in its rotation, a large quantity of air is mingled with the milk; also in so constructing the churn tub that it effectually prevents the milk from splashing out of the churn, without interfering with the free action of the dasher."

Claim.—"What I claim as my invention, is the combination of the inverted vessel and the disk on the stem of the dasher, to prevent the splashing out of the cream at the churn lid."

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67. For an *Improvement in the Cotton Press;* A. D. Brown, Clinton, Jones county, Georgia, January 22.

The patentee says,—"The nature of my invention consists in providing an eccentric grooved pulley in combination with the pressure block, chain, and capstan, or gin; the whole being so combined that the eccentric pulley will move in such a manner that the velocity of the follower will be greatest when the least power for compressing is required, and the velocity of the follower least or less when the greatest amount of compressing force is required, with a uniform velocity of the lever of the capstan."

Claim.—"I claim the pulley with its axis eccentric to its centre, in combination with the stock or follower of the pressure block, to compress cotton, &c., in the bale box, in the manner substantially as described."

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68. For an *Improvement in Brick Presses;* John Butler, Buffalo, New York, January 29.

Claim.—"What I claim as my invention, is the combination of the crank, chain, and oscillating frame or carriage with the stationary bed of rollers; the whole being arranged and operated as described, for the purpose of supporting the moulds while being filled and pressed, striking the bricks and thus pushing the moulds out of the machine."

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69. For an *Improvement in Wash Mixtures;* Stephen Crane, Charleston, South Carolina, January 29; anté dated January 19.

Claim.—"What I claim as my invention, is the above described compound, consisting of soap and ley, pearl ash, or soda, with ammonia and spirits of turpentine in the proportions substantially as set forth."

70. For *Improvements in Utero-Vaginal Supporters;* Russel Caulkins, Sandusky City, Erie county, Ohio, January 29.

The patentee says,—"My invention consists in an instrument, the principal object of which is to enable females suffering under diseases known as prolapsus uteri and prolapsus vagina, to perform the necessary operations themselves without surgical aid. It is formed of a hollow tube of metal provided with a plunger, and also with two fingers or elevators for raising and replacing the uterus in its proper position after the tube has been inserted in the vagina.

It further consists in a capsule of gum elastic or other suitable material, which I place over the mouth of the tube, and force, distended by a piece of sponge, into the vagina, for the purpose of supporting the parts in their proper position, after having been raised by the elevators or fingers."

Claim.—"What I claim as new, is, 1st, the combination of the elevating levers with the tube made of any material, and the mode of elevating and spreading the said elevating levers by the screw with its conical groove, as herein described, or in any way substantially the same.

"2d, I further claim the capsule, distended by the sponge, introduced through the tube for the purpose of supporting the uterus and vagina, in the manner set forth."

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71. For an *Improvement in Steam Boiler Furnaces;* English, Bennet, Frisbee & Crawford, assignees of Benjamin Crawford, Allegheny City, Allegheny county, Pennsylvania, January 29.

The patentee says,—"The nature of my invention consists, 1st, in heating the air required for the combustion of the fuel by the waste steam of the engine and the waste heat of the boiler flues, and then forcing it through the ash-pit into the fire by jets of steam which are mingled with the heated air, and likewise pass into the fire.

"2d, In the employment of self-revolving adjutages to discharge heated steam among the gases above the fuel in the grate, to co-operate with the hot air and steam forced through the ash-pit, in producing a perfect combustion, while the draft is maintained by jets of steam discharged through self-revolving adjutages in the smoke-pipes."

Claim.—"What I claim as new, is the injection of whirling jets of highly heated steam among the gases evolved by the fuel on the grate, simultaneously with the forcing, by the steam blower, of a stream of mingled steam and heated air through the ash-pit into the fire; the air being heated substantially in the manner described by the exhaust steam and waste heat of the flues, and the draught of the flues being maintained by whirling jets of steam injected by the steam blower."

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72. For *Manufacturing Illuminating Gas from Bitumen;* Abraham Gesner, Halifax, Nova Scotia, January 29.

The patentee says,—"My discovery consists in having obtained from compact and fluid bitumen, asphaltum, chapapote, and mineral pitch, a new illuminating gas, which I denominate 'Kerosene Gas.' This gas differs from all other illuminating gases, for, as the bitumen contains no sulphur nor nitrogen, it is free from sulphuretted hydrogen, sulphurous acid, sulpho cyanogen, cyanogen, ammoniacal gas, and azote, and its relative quantities of carbon and hydrogen differ from those of the gases heretofore used for the purposes of illumination."

Claim.—"What I claim as my invention, is the use of compact and fluid bitumen, asphaltum, chapapote, or mineral pitch, for the production of illuminating gas, to be substituted for other materials now in use. I also claim the retort, in combination with its movable case, in the manner and for the purposes set forth."

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73. For the *Preparation of Animal and other Manures;* Robert Hare, Philadelphia Pennsylvania, January 29.

The patentee says,—"My invention has for its object to produce a concentrated nitrogenous manure, as an artificial substitute for guano."

Claim.—"What I claim as my invention, is the use of the mineral acids to act upon the soft parts of animals, or upon azotous vegetable matter, at temperatures varying according to circumstances, as herein set forth, for producing a concentrated manure.

"2d, I also claim the combination of the mineral acids with the different salts, as described, for modifying the anti-septic action of the acids on azotous materials, and for rendering them pulverulent, whether said azotous materials be animal or vegetable.

"3d, I also claim the combination of the mineral acids with wood tar, coal tar, or their equivalents, in the manner and for the purposes set forth."

74. For an *Improvement in Apparatus for Heating Air by Hot Water;* Adrian Janes, City of New York, January 29.

The patentee says,—"My improvement consists in the peculiar construction, combination, and arrangement of a cluster of pipes for heating the surrounding air by the passage of hot water through them."

Claim.—"What I claim as new, is the peculiar construction and arrangement of the heating apparatus, by uniting the series of straight horizontal pipes into gangs by vertical end pieces, through which the circulating water is conveyed to all the pipes in the gang, in combination with the union boxes, the series of gangs forming the cluster being united at one end at the top of the end pieces by the union box, and at the opposite end at the bottom by a similar box, through which the water circulates to all the pipes, by means of a flow and return pipe connected with the boiler or heater at the furnace, as specified."

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75. For an *Improvement in Self-Waiting Tables;* Josiah Lamb, New London, Howard county, Indiana, January 29.

The patentee says,—"The nature of my invention consists in making a dumb waiter automatic or self-acting by means of suitable mechanism, so that great convenience and security from accident accrue to those partaking of meals at the table."

Claim.—"What I claim as new, is arranging and operating a dumb waiter and fan so as to cause them to be self-acting, substantially in the manner and for the purpose described."

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76. For an *Expansion Gear for Puppet Valves;* Thomas McLaughlin, City of New York, January 29.

The patentee says,—"The nature of my invention consists in the producing of a more easy and safe cut-off for steam, by the combination attachment to the end of the rock-shaft of an arm or lever, having an angular quadrant-shaped opening in it of about 90°, more or less, and attached to the back of it, by means of a pin or bolt through its lower end, a quadrant-shaped plate, which has three holes pierced through it, (a greater or less number may be used if required,) for the purpose of proportioning the half, three-quarter, or full supply of steam. Into either of these holes, and through the angular opening in the arm, is attached one end of a connecting-rod, the other being bolted to a reciprocating plate connecting the ends of the two eccentric rods on the main shaft."

Claim.—"What I claim is the use and employment of the connecting-rod, acted upon by two eccentrics, in combination with the reciprocating plate and arm, having an angular opening in it, and quadrant-shaped plate, or its mechanical equivalent, attached thereto, for the purpose of working puppet valves, in form and manner substantially as set forth."

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77. For a *Composition for the Manufacture of Sugar;* Louis de Saulles, New Orleans, Louisiana, assignee of L. H. F. Melsens, Louvain, Belgium, January 29; anté dated August 15, 1849.

The patentee says,—"My process for the extraction of the crystallizable sugar contained in the sugar cane, in the beet root, in the Indian corn, &c., by which it can be obtained without loss by either cold or hot, or by slow, or by rapid, evaporation at will, consists in the employment of the sulphite of lime dissolved in sulphurous acid, or generally in the employment of an acid sulphite of lime; the bisulphite is the combination that I prefer."

Claim.—"That which I claim as my invention, is the mutisme or process of treating saccharine solutions by means of a solution of acid sulphite of lime, baryta, or strontia, as herein before described, applied to products containing sugar from the cane or other vegetables, that the crystallizable sugar may undergo no chemical change, either by the formation of secondary products, which destroy it, or by the generation of ferments, which modify or transform it."

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78. For an *Improvement in Driving Bobbins upon Spindles;* Oliver Pearl, Essex county, Massachusetts, January 29.

The patentee says,—"The particular feature of my invention, which relates to the friction button of the throstle spindle, consists in enlarging the diameter of it somewhat beyond that of the button in ordinary use, and in countersinking the upper surface of the same, so as to make it somewhat like a cup, as well as to leave on the upper side or surface of the button, and its outer edge, a narrow ring or annulus of surface on which a similar annulus of leather, or other proper friction material, is to be connected or otherwise properly fixed, the bobbin to

rest directly upon the top surface of such leather, as it generally does upon the disk or washer in common use."

Claim.—"What I claim as my invention, is the countersunk friction button, made substantially as specified, or, in other words, the combination of the friction annulus with the enclosed space for the reception of dirt and extraneous matter, when used in connexion with the spindle and bobbin, substantially as specified."

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79. For an *Improvement in Gearing for Sugar Cane Mills;* Edward Phelps, Pittsburg, Pennsylvania, January 29.

The patentee says,—"The main purposes of my invention are to prevent the loading of the pivot of my main vertical roller shaft with the weight of the heavy cog wheel which drives it, while I secure a true horizontal motion of the wheel itself, and to allow for the vibratory motions of the said roller shaft, consequent on the irregularities of strain brought upon the rolls by the variable nature of the work which they have to perform."

Claim.—"What I claim as my invention, is the wheel revolving horizontally, in combination with the jointed or loose braces, connecting but not fastening it to the shaft, and with the fixed arm, the vertical grooves, and the friction rollers, acting together substantially in the manner and for the purposes herein set forth."

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80. For a *Method of Sinking Hollow Piles, &c., by Exhausting the Air from the Interior of the Same;* Lawrence H. Potts, London, England, January 29; anté dated December 5, 1843.

The patentee says,—"My invention consists of using tubes of various sizes, forms, and materials, and causing the plastic or permeable matters, the silt or alluvial debris, to ascend by the pressure of the atmosphere commonly called suction. The tube, caisson, tower, or pile, then descends till it reaches a firm foundation, the silt, clay, mud, or other debris being removed from the interior of the tubular pile, which may be effected by the same means that stones and cement are inserted, and by chemical combination form a solid rock."

Claim.—"What I claim as new, consists in the attenuation of the air approaching to, or forming a vacuum in, the interior of a hollow pile, tube, caisson, shaft, or other structure by any of the known means of producing what is termed suction, by which the hollow pile, tube, shaft, or other structure, is made to descend as before before described."

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81. For an *Improvement in Looms for Piled Fabrics;* James Turnbull, Jr., and John Turnbull, Simsbury, Hartford county, Connecticut, January 29.

Claim.—"What we claim as our invention, is, 1st, dividing the heddles into two or more divisions to be worked in succession, substantially as described, that the entire opening of the shed may be effected in succession, and thus avoid the evil effects consequent on the opening of the shed at one operation as heretofore, as described.

"2d, Operating the two picker levers or treddles by means of a shifting tappet, operating or shifting alternately for each pick by means of an eccentric or its equivalent, that the shaft which carries the tappet or tappets may make one entire rotation for each throw of the shuttle, substantially as described, and thus operating the shuttle by a tappet rotating with greater velocity than by any means heretofore known, as described."

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82. For an *Improvement in Mills for Grinding;* Benjamin Gould, assignee of Joseph W. Webb, Ledyard, Cayuga county, New York, January 29.

Claim.—"What I claim as my invention, is the combination of the cone screws, as above described, with the beaters or rubbers on the cylinder, substantially as described."

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83. For *Improvements in Flour Bolts;* John M. Reed and William B. Willis, Charlestown, Jefferson county, Virginia, January 29.

Claim.—"What we claim as our invention, is the combination of the revolving wire screens with the ordinary bolts, whether stationary or revolving, for bolting flour, by which the larger particles of bran and extraneous substances, that may chance to pass into the bolts with the meal, are separated therefrom by the said wire screens, and are thus prevented from coming in contact with the bolting cloth, whilst the wings drive the flour through the screens and

bolting cloth by the combined action of centrifugal force and currents of air produced by the rotary motion of said wings, by which the advantages stated are gained."

ADDITIONAL IMPROVEMENT FOR JANUARY, 1850.

1. For an *Improvement in Ice Cream Freezers;* H. B. Masser, Sunbury, Northumberland county, Pennsylvania; patented December 12, 1848, additional improvement annexed January 1, 1850.

The patentee says,—"My additional improvements consist in making the centre dasher stationary, while the freezer or reservoir revolves around it, and in so constructing the dasher as, with a small amount of power, to scrape the frozen cream from the inner surface of the reservoir as soon as it accumulates thereon, during the whole process, thereby forming the cream into a firm and uniform mass in a very short space of time."

Claim.—"What I claim is, 1st, the spring blade or scraper, constructed and employed as above described."

RE-ISSUES FOR JANUARY, 1850.

1. For an *Improvement on the Carding and Spinning Machines Denominated the Card Spinner, for manufacturing yarn from two or more different materials at the same time;* Richard S. Stewart, Executor of George Law, assignee of Moses Chase, Baltimore, Maryland; patented March 23, 1842, re issued January 1, 1850.

Claim.—"What I claim as new, is the combination by which the said composition thread or yarn is produced, as described, consisting of the delivering rollers between which the covering material and the thread to be covered come in contact as described, combined with the said doffer cylinder, the spindle for twisting the thread while it is in contact with the covering material, and the spool supplying the thread to be covered, all as described, or their mechanical equivalents, in like combination and for the purpose set forth."

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2. For an *Improvement in Churns;* Z. C. Robbins, St. Louis, Missouri; patented June 1, 1849, re-issued January 1, 1850.

The patentee says,—"The nature of my invention consists in giving such a form to a rotating agitator that the beaters placed upon it will cut through the milk or cream edgewise, and, by their broad parallel or converging surfaces, raise a portion of the cream at each revolution up into the air in the upper part of the churn, and thereby separate the particles thereof, for it will readily be perceived that two broad parallel or converging surfaces, placed tangential to their circle of rotation, will raise a body of liquid filling nearly the whole space, and gradually distribute it above, while the outer surface will prevent its flying off; by which means I am enabled to get a greater amount of agitation, and distribute the milk or cream through the air more perfectly than in any other way by which it can be accomplished, the agitator performing, by its rotation, an operation upon milk or cream similar to that produced by knives upon the whites of eggs during the process of what is called whipping them up."

Claim.—"What I claim as my invention, is the series of parallel floats and beaters formed and arranged within the agitator, substantially as above described, so that when their motion is reversed, their thick inclined rear edges will gather the butter into a roll in the centre of the agitator, substantially as herein set forth."

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3. For an *Improvement in Cooking Stoves;* James Root, Cincinnati, Ohio; patented July 18, 1848, re-issued January 22, 1850.

The patentee says,—"The nature of my improvement consists in carrying the ash-pit under the sunk hearth of the stove, so as to enlarge the oven, and in the manner of constructing and arranging the independent back plate of the fire chamber, so as to readily enlarge or contract said chamber, and direct the ashes into the pit beneath."

Claim.—"What I claim as my invention, is the movable back plate, for contracting the fire and protecting the oven plates, as herein set forth; and I wish it to be understood that I do not claim the employment of double plates at the back of the fire, when such plates are stationary, but only when made movable, so that the front and top plates of the oven are always protected back as far as the flanch on the movable plates extends.

"I also claim, in combination with the elevated fire chamber, and projecting oven under

a part of said fire chamber, the ash-pit, formed by projecting the bottom and sides of the stove under the sunk hearth, which is level with the bottom of said fire chamber."

Design for January, 1850.

1. For a *Design for Stoves;* Henry L. Sheperd, Dayton, Montgomery county, Ohio, January 8.

Claim.—"What I claim as my invention, is the combination and arrangement of the ornamental forms and figures represented in the accompanying drawings, forming an ornamental design for a cooking stove."

List of American Patents which issued in February, 1850, with Exemplifications by Charles M. Keller, *late Chief Examiner of Patents in the U. S. Patent Office.*

1. For an *Improvement in Machinery for Spooling;* Avery Babbett, Auburn, Cayuga county, New York, February 5.

Claim.—"What I claim as my invention, is not the abstract production of friction between the thread or yarn and any other substance, as the thread or yarn passes from the runners to the bobbin or spool, so as to secure the winding of the thread or yarn tightly on the bobbin or spool; but I do claim the combination of machinery herein before described, whereby, in machines for winding yarns or threads on bobbins or spools, the thread or yarn, on its passage from the runners to the bobbin or spool, has applied to it friction produced between the thread or yarn and any other substance, which friction diminishes with uniformity as the pull upon the thread or yarn from the runners increases, and increases with uniformity as the pull upon the thread or yarn from the runners diminishes; such combination consisting, as shown in the accompanying drawings, of the vibrating lever, the stand, the joint, the three pins N O P, the four pins H I J K, the box, the spiral spring, any one of the three hooks, the staple at R, and the guide, substantially as set forth."

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2. For an *Improvement in Carding Machines for Preparing Bats for Felting;* Samuel G. Blackman, Norwalk, Fairfield county, Connecticut, February 5.

The patentee says,—"The nature of my invention consists in interlocking the fibres of wool while they are on the doffer of a carding machine, by curling their extremities backwards, laterally, or obliquely, by means of the action of some suitable rubbing or combing surface, brought nearly in contact with the teeth of the doffer."

Claim.—"What I claim as my invention, is the production of the requisite interlocking combination of the fibres of wool preparatory to converting the same into felt cloth, by subjecting the said fibres to a rubbing or combing action while they are upon the doffer of a carding machine, by means of auxiliary cards or other suitable friction surfaces, substantially as herein set forth; not intending by this claim, however, to limit myself to the special and particular manner of producing the said interlocking of the fibres of wool while they are upon the carding machine doffer, as herein set forth."

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3. For a *Preparation of Portable Soup Bread;* Gail Borden, Jr., Galveston, Texas, February 5.

The patentee says,—"The nature of my invention consists in extracting the nutritious parts of flesh or animal meat of every description, and combining this concentrated extract with flour or vegetable meal, and baking the two substances in an oven, thereby forming a portable desiccated soup bread, containing a large amount of the most important alimentary substance, in a very small bulk and convenient form, well adapted to seafaring purposes, travelers, hospitals, and also for family use, which will save the trouble and expense of much cooking."

Claim.—"I claim the new and useful manufacture of desiccated soup bread, formed of the concentrated extract of alimentary animal substances, combined with vegetable flour or meal, made into cakes and baked into bread, in the manner substantially as herein described, for the purpose set forth."

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4. For an *Improved Excavating Auger;* James Buck, Buckport, Hancock county, Maine, February 5.

Claim.—"What I claim as my invention, is the formation of a machine or instrument for boring the earth under water or otherwise, and retaining the substance bored until it can be

brought to the surface, which I construct in the manner following: I first make two sections of a cylinder, or pods, the one of which is enough smaller than the other to admit its turning into the larger one, and I connect them together by pivots through the ends of each. the larger section of a cylinder, or pod, having a lip similar to a pod auger, and I attach a shaft or handle firmly to the upper pivot, which pivot passes through the centre of the outer section of a cylinder, or pod, and is attached firmly to the smaller section of a cylinder, or pod, so that, by turning the shaft one way, I put it into a pod auger shape ready for boring; by reversing the motion of the handle or shaft, it turns the inner section of a cylinder out of the other, making it into a cylindrical or bucket shape, and thereby secures the substance bored."

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5. For an *Improvement in Whip Lashes;* David N. Day and Edward B. Day, Westfield, Hampden county, Massachusetts, February 5.

The patentees say,—"Our invention consists in making the whip lash by the combined operations of spinning, and twisting, and plaiting: that is to say, by plaiting spun and twisted threads of cotton, silk, and other fibrous substances, instead of thongs or strips, which, from the difficulty of obtaining of the requisite length, require to be frequently spliced in the operation of plaiting, and do not possess the same pliancy as threads; the plaiting of such lashes in the manner described being done on a core, made of a cord, extending through the whole length of the lash, that it may sustain the strain to which whip-lashes are subjected, and thus protect the plaited cover from injury by being pulled, and the swell of the core being made of any kind of cloth which is pliant, and attached to, and combined with, the central core, the said cloth being cut in an elliptical form, and attached to the central core without rolling it up, that by plaiting around it, for (from) the pliancy of the cloth, it will be compressed into the required form to leave the outside of the lash round and smooth."

Claim.—"What we claim as our invention, is a new manufacture for whip-lashes, by making plaited whip-lashes of spun and twisted threads or cords, as described, instead of leather thongs, the same being plaited over a central cord or core extending the whole length as described, and a swell made of cotton, or other soft and pliable cloth, attached to the central core without rolling, substantially as described."

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6. For an *Improvement in Machines for Cutting Staves;* Charles B. Hutchinson, Waterloo, Seneca county, New York, February 5.

The patentee says,—"The nature of my invention and improvement consists in arranging upon a suitable platform, and in close proximity, apparatus for cutting and jointing the staves, and cutting the heads of barrels, casks, &c., of such form and construction as will cut the staves to the proper curvature, and joint their edges with a drawing stroke, and cut the heads upon a like principle, with correctness and despatch, smoother and with a thinner knife than the modes generally employed for these purposes, and less liable to check the staves; and also in applying to the apparatus, minor improvements, which will be made apparent in this specification."

Claim.—"What I claim as my invention, is the mode of cutting staves to the required curvature with a spiral drawing stroke, by means of the segmental plate, having bars or ribs at its ends to which the knife is attached; segmental rims, moving in the segmental slots formed in the side plates, and containing slots through which the segmental plates move, spiral slots in the segmental plates, and bars passing through the same, substantially as set forth."

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7. For an *Improvement in Washing Machines;* Joel Haines, West Middleburgh, Logan county, Ohio, February 5.

Claim.—"What I do claim, is making a disk with a hinged segment, to admit the clothes beneath the same, being so arranged as to rise and fall vertically as it is turned horizontally over the clothes, by turning the vertical rock shaft to the right and left, as described."

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8. For *Improved Friction Roller Sash Supporters;* Joseph Maynard, Philadelphia, Pennsylvania, February 5.

The patentee says,—"My invention consists in fitting each sash of a window with friction rollers let into its edges, and pressed by springs against the window frame, the rollers being so arranged that, while they turn freely and offer no hindrance to the raising of the sash, yet when the sash is raised, they bind in their sockets so tightly that the friction engendered prevents it from descending by its own weight."

Claim.—"What I claim as my invention, is the combination of the loose roller, spring,

and friction wheel, applied to the window sash, as herein set forth, whereby the sash is held in any position to which it may be raised."

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9. For *Improvements in Engines for Carding and Drawing Wool;* Charles Jackson and James Moir, Cazenovia, Madison county, New York, February 5.

The patentees say,—"The nature of our invention consists in providing a condensing cylinder, with a reciprocating rod, to give the said cylinder a reciprocating motion in combination with its usual rotary motion, so as to spread out and mix the wool better than has been heretofore done, for the production of better roving, and to obviate the employment of more than one doffer.

"Also, in providing a twisting band and drawing rolls, to be used in combination with rubbing rolls of the common construction, to draw the roving on the carding machine, reducing it, prepared for the jack or spinning machine."

Claim.—"1st, We claim the combination of what is termed the main or condensing cylinder with the reciprocating rod, to give the carding cylinder a reciprocating side to side motion in combination with its rotary motion, in the manner substantially as herein described, or in any other manner substantially the same, to produce the same effects.

"2d, We claim the combination of a twisting band and drawing rolls with rub rolls of the common construction, for the purpose of reducing roping by drawing it with twist upon the carding machine, in the manner substantially as herein described, or in any other analogous manner."

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10. For an *Improved Method of Punching Between Rollers;* Richard Montgomery, City of New York, February 5.

The patentee says,—"My improvements consist in a combination of several elementary processes in one, for the purpose of facilitating the manufacture, the advantages of which are, a greater expedition in the construction of a boiler, and greatly reducing the cost, while I am enabled thereby, also, to increase the strength over an ordinary boiler."

Claim.—"What I claim as new, is the apparatus for the purpose of punching, consisting of a series of punches thrown out at proper intervals, substantially as above described, either with or without the combined operation of corrugating said plates, as above described."

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11. For an *Improvement in Calculating Machines;* Du Bois D. Parmelee, New Paltz, Ulster county, New York, February 5.

The patentee says,—"The nature of my invention consists in an apparatus for making accurate additions of long columns of figures, by means of a movable index or register acted upon by the keys of a finger-board."

Claim.—"What I claim as of my own invention, is the making additions of figures by means of a finger-board of keys, each communicating a proper and known motion to an indicator, substantially in the manner and for the purposes described."

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12. For an *Improvement in Water Metres;* William Sewell, Jr., Williamsburg, Kings county, New York, February 5.

The patentee says,—"My invention consists in arranging an apparatus so as to move with the least amount of force that can be attained, and maintain the metre water-tight, or nearly so, and in affording the greatest capacity within a given compass."

Claim.—"What I claim as new, is the employment of a flat spring, with both sides of which the water, as it enters, communicates, substantially in the manner and for the purposes set forth, in combination with the wings, with an adjusting spring in the centre, by means of which improvements I relieve the apparatus from danger arising from obstructions in its movement, and the strain caused by the transmission of a non-elastic fluid, and cause it to move with less friction than any other form with which I am acquainted."

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13. For an *Improvement in Attachments for Lightning Conductors;* James Spratt, Cincinnati, Ohio, February 5.

Claim.—"What I claim as new, is forming the eye of the metallic attachment with an opening, to allow the passage of a lug on the neck of the isolator, and so that the rod also can be inserted after the attachment is secured to its place, when this is combined with a lug on the shank of the attachment corresponding to that on the isolator, substantially after the

manner and for the purposes set forth: that is to say, enabling the rod at any time to be inserted or withdrawn, without disturbing the attachment in the building."

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14. For *Improvements in Barrel Machinery;* Solomon Andrews, Perth Amboy, Middlesex county, New Jersey, February 12.

Claim.—"I claim as my invention in the stave cutter, the eccentric groove and cap extending over and around the shaft to the side opposite the knife, the said cap constituting a part of the eccentric cam ring passing around the shaft, and having an opening through the said cam ring at the posterior termination of the cap, where the staves make their exit. And I also claim the whirl or secondary shaft, as described, in combination therewith.

"I claim as my invention, the right and left stave-holders in the jointer, having flanches or thumb pieces to support the edge of the stave during the operation of jointing, and to ensure an equal width at each end.

"I also claim as my invention, the horizontal jointer, in combination with an inside and an outside frame, to which the right and left stave-holders are attached by hinges, and by which arrangement four or more boys may work around one horizontal wheel or jointer and operate simultaneously, being also thereby enabled to joint the staves with the grain of the wood, without loss of time.

"I claim as my invention, the movable centre in the head machine, in connexion with the opposite face plate on an universal joint, between which the head block is held before it is brought in contact with the rubber of the face of the chuck, and the slide which holds the chisels, substantially in the manner set forth.

"I claim as my invention, the combination of the cutter with the jointed spring cutter and levers for cutting the locks in wooden hoops, substantially as described."

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15. For a *Machine for Cutting Cotton Stalks in the Field;* Fields Bradshaw, Clinton, Greene county, Alabama, February 12.

Claim.—"What I claim as my invention, is the adaptation of iron and steel knives or cutters to the cutting down, and cutting to pieces, of cotton stalks, either in a green or dry state, in the manner and for the purpose described."

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16. For *Improvements in Machinery for Folding Cloth;* Augustus C. Carey and Daniel C. Bagley, Amesbury, Essex county, Massachusetts, February 12.

The patentees say,—"The nature of this invention consists in placing at the upper part of a suitable frame a horizontal table, having an up and down movement, and arranging on the side of the same horizontal shafts, having sharp toothed combs or prickers, notched bars, and bent bars or arms attached, and connected by radial arms, and connecting-rods or bars to a horizontal revolving shaft, which operates a graduated notched wheel, in such a manner as to fold the cloth, and measure the same as it is laid evenly on said table."

Claim.—"What we claim as our invention, is the mode of folding and laying the cloth on the table or platform, kept in a state of equilibrium by the weight, wheel, chain, and rod, by means of the notched bars attached to the radial rods secured to the shafts, combs attached to the shafts, segmental plates, bent bars, arms, horizontal and inclined connecting-rods or bars, slotted arm or crank, constructed, combined, arranged, and operated as herein set forth."

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17. For an *Improvement in Rule and in Socket Joints;* Charles Chinnock, City of New York, February 12.

Claim.—"What I claim as my invention, is the application to the rule joint, and to the ball and socket joint, of the rod, which is hinged into the ball or rule joint, to hold the joint as firm as desired by means of the spiral spring on the India rubber springs, as described."

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18. For *Improvements in Arrangements of Flyers and Spindles;* John Dermond, Paterson, Passaic county, New Jersey, February 12.

The patentee says,—"My invention consists in bolting, or in any other way firmly securing, the spindle to the step or foot rail of the machine, and in having the tube, to which the flyer is attached, with its inner diameter greater than the diameter of the spindle, so that it revolves outside the spindle concentric with it. The spindle and tube are entirely independent of each other, and do not touch each other while working. This arrangement will obviate the inconvenience generally found to arise from the vibration of the spindle when it revolves with

the flyers attached, and will preserve an uniform drag on the thread while it is being twisted. The lower end of the tube rests in a step-bearing attached to the frame of the machine, and is kept in a vertical position by means of a guide near its upper end. This guide, and also the step-bearing, are capable of adjustment should the tube deviate from a vertical position."

Claim.—"What I claim as my invention, is the manner of suspending the flyer separate from the spindle, by the flyer being connected to, and forming a part of, the tube, the lower end of which revolves in a socket-bearing, allowing the spindle of the bobbin to pass and move through it without touching it, so that, however great the speed of the flyer may be, it will be prevented from vibrating the spindle."

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19. For *Improvements in Air-Heating Furnaces;* Henry A. Engles, Cincinnati, Ohio, February 12.

The patentee says,—"The nature of my invention consists in arranging a pair of concentric cylinders over a furnace, so that the flue can be made to pass spirally between the cylinders, thus making the inside face of the inner cylinder and the outside face of the outside cylinder radiating surfaces; and, in addition to this attaching the base of a cone-shaped drum or chamber to, and inside, the lower end of the inner concentric cylinder, (or in any other suitable way,) so as to obtain a radiating surface from the outside of the drum, which is thus made to form the roof of the furnace; the whole fixtures thus being made to furnish the most extensive radiating surface within the smallest possible compass. This arrangement also enables a small air chamber to furnish a comparatively large amount of heated air.

"Another feature of my invention consists in combining with the furnace a steam-infuser, whereby the heated air in the chamber surrounding the furnace is supplied with an adequate degree of moisture, so arranged as to be regulated at pleasure, and thus obviating the unhealthy and disagreeable effects due to air which, in the process of being heated, is rendered too dry for being breathed, and therefore unfit for domestic or other apartments."

Claim.—"What I claim as new, is constructing a furnace for heating air with a spiral flue passing up between concentric cylinders, when this is combined with a conical roof to the furnace within the inner concentric cylinder, thus obtaining the most extensive radiating surface within the least space, and in the most compact and simple form."

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20. For an *Improvement in Augers for Boring Machines;* George Flautt, Cavetown, Washington county, Maryland, February 12.

The patentee says,—"My machine is arranged to bore a series of holes according to a pattern attached to the carriage on which the post is secured, and the auger is composed of two separate portions, the cutting bit and the pod, the latter revolving upon the stem of the former with a greater velocity, thus quickly discharging the chips removed by the cutting bit, and preventing the choaking of the hole."

Claim.—"What I claim as my invention, is making the pod of an auger separate from the stem, on which it is revolved with a considerably greater velocity than the cutting bit, substantially as herein set forth."

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21. For an *Improvement in Horse Rakes;* Alvan Hovey, Brookfield, Orange county, Vermont, February 12.

Claim.—"What I claim as my invention, is the method of working the rake-head by means of the treadle, in combination with the hand bars and the back piece, as described. I also claim the attachment of the stilts to the thills, in the manner and for the purpose described; all of which gearing being so arranged that a person on his seat may change and discharge, or suspend, the rake-head at pleasure, as herein set forth."

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22. For an *Improvement in Hanging Carriage Bodies;* M. G. Hubbard, Hume, Alleghany county, New York, February 12.

The patentee says,—"The nature of my invention consists in the peculiar construction and arrangement of the reaches, and in the application of a spring thereto, by which the carriage is supported."

Claim.—"What I claim as my invention, is the combination of cross reaches and spring, substantially in the manner and for the purpose set forth."

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23. For an *Improvement in Railroad Trucks;* James Ingersoll, Grafton, Loraine county, Ohio, February 12.

Claim.—"What I claim as new, is the combination of an endless track, on the frame of

the carriage, with an endless series of rollers, running thereon and guided by flanches, the endless track being supported on the peripheries of the rollers which intervene in endless succession between it and the surface of the ground or rail, and which are broad enough to keep themselves erect and steady without the use of axles or rods extending across the carriage."

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24. For *Improvements in Planing Machines;* Nicholas G. Norcross, Middlesex county, Massachusetts, February 12.

Claim.—"What I claim as my invention, is the combination of the rotary planing cylinder, and the rest, with mechanism by which the two can be freely moved up or down, simultaneously and independently of the bed or platform, or any analogous device, substantially in the manner and for the purpose of reducing a board to equal thickness throughout its length; all as specified.

"I also claim the above described improvement of making the under side of the rest concave, in combination with so extending the part under the rest, and applying it to the concave part thereof, as to cause the board, as it passes across the rest, to be bent and presented with a concave surface to the operation of the rotary cutter planing cylinder, substantially as specified, the same being for the purpose mentioned."

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25. For an *Improvement in Bed-Clothes Clasps;* Francis A. Rockwell, Ridgefield, Fairfield county, Connecticut, February 12.

The patentee says,—"My invention consists, 1st, of applying clasps, by means of springs with screws, or the cam and lever acting upon a bar or spring, to the rails, timbers, or frames of bedsteads, on either side or end, and on either side or end of the rails, timbers, or frames thereof."

Claim.—"What I claim as my invention, is the use of the cam and lever, acting on the spring, to constitute a clasp in the manner and for the purpose set forth."

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26. For an *Improvement in Tanning Apparatus;* Wm. H. Rosensteel, New Oxford, Adams county, Pennsylvania, February 12.

The patentee says,—"My improvements relate to the general plan of the tannery, to the manner of constructing and operating the liming vats, the manner of constructing and operating the vats in which the skins are tanned, and the manner in which the hides are handled."

Claim.—"What I claim as my invention, is, 1st, revolving the tanning cylinders alternately in opposite directions, substantially as herein set forth.

"2d, Handling the hides in the spent liquor from the tan vats, substantially in the manner set forth.

"3d, Liming hides or skins in a close revolving cylinder, substantially as set forth."

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27. For an *Improvement in Smut Machines;* Leonard Smith, Troy, New York, February 12.

The patentee says,—"The nature of my invention consists in the so arranging the machine, that the blowers and the whole scouring machinery are combined and arranged in the same casing, and rendered a complete machine in itself for pulverizing the smut, scouring and separating the smut, chaff, and other foreign matter, and acting on the fibre ends of the kernel, where smut and other dirt is most likely to adhere."

Claim.—"What I claim as new, is, 1st, the grates in the top of the machine, in combination with the scrolls or spiral chambers and spouts, for discharging smut and other light materials carried up by the blast, as set forth.

"2d, I claim the chamber at the bottom of the cylinder, which concentrates and gives free discharge to all foreign matter to be separated from the grain by the blast in the last stage of operation of the machine, in the manner described.

"3d, I claim, in combination with the concave bottom which gathers the grain for its discharge from the machine, the distributors which give direction in the discharge of the grain separated from the foreign matter by the blast.

"4th, I claim the draft floats, in combination with the scouring surfaces, for cleaning buckwheat, as set forth. The whole being constructed, arranged, and operating substantially in the manner and for the purpose set forth."

28. For an *Improved Method of Bolting in Window Shutter Openers and Fasteners;* Saml. B. Snedaker, Cincinnati, Ohio, February 12.

The patentee says,—"The nature of my invention consists in an arrangement of mechanism whereby a window blind, operated from within the house, can be fastened in any desirable position, in such a way as at the same time to relieve the pintle of the hinge from any strain athwart its axis."

Claim.—"What I claim as new, is fastening the window blind at any suitable point, by means of bolts projecting on opposite sides of the pintle of the hinge, by a driver, the bolts and driver being suitably guided, and the bolts passing into suitable notches on a plate attached to the blind or to the upper leaf of the hinge, thus not only retaining the blind in any desired position, but also at the same time relieving the pintle of the hinge from any strain athwart its axis; the whole being arranged substantially in the manner and for the purposes described."

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29. For an *Improvement in Electric Telegraphs;* William S. Thomas, Norwich, Chenango county, New York, February 12.

The patentee says,—"My invention consists in making marks or signals for telegraphic purposes, by means of the heat generated, developed, or controlled by the passage of an electric current along attenuated conductors, wires, or points."

Claim.—"What I claim as new, is the making of signals or marks for telegraphic purposes, by the agency of the heat generated, induced, or controlled by a current of electricity passed along attenuated conductors, wires, or points, substantially as herein set forth; the signals being the flashes of light emitted by the heated conductor or points, are manifest to the eye of the operator; the marks being produced on the paper by the heated points or conductor, are the record of the message."

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30. For an *Improvement in Castors for Furniture;* Solomon B. Ulmann, City of New York, February 12.

The patentee says,—"The nature of my invention consists in bringing the centre of the roller of the castor in or near the line of the centre of the foot to be supported, whereby the castor is rendered less liable to be thrown out of repair, and makes a better finish to the leg and foot of furniture."

Claim.—"What I claim, is neither the ball, the socket, the vertical pivot, or either of the pivots of the ball, but the combination of the whole as above substantially specified, whereby the ball of the castor is enabled to revolve across the two centres of the two axes of the ball as set forth."

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31. For an *Improvement in Connecting Trucks with Car Bodies;* George Vanderhoof, Paterson, Passaic county, New Jersey, February 12.

Claim.—"What I claim as my invention, is the mode of attaching car bodies to trucks, by means of the trough, (with the sloat and king bolt,) and the rail constituting the segment traverse, as above described."

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32. For *Improvements in Machinery for Turning Umbrella Sticks, &c.;* Solomon West and Hiram Plumb, Honesdale, Wayne county, Pennsylvania, February 12.

The patentee says,—"The nature of this invention consists in introducing the stick to be cut to revolving knives or cutters, arranged at the end of a hollow shaft, and made movable, so as to make them conform with any required diameter of stick, and causing the stick, after being properly turned, to be drawn through said hollow shaft by means of a receiver or carriage moving on slides, and discharged at the back part of the machine; the several parts for producing these effects being operated by band, cogged and bevel wheels, secured on suitable shafts turning in boxes in the frame, and put in motion by manual or other convenient power."

Claim.—"What we claim as our invention, is the combination of the hollow shaft or cylinder, graduating cutters or knives, made and ground exactly alike, and arranged on opposite sides of said shaft or cylinder, and cutting inward and in exact unison with each other; the feeding rollers arranged in front, and the receiver or carriage arranged in the rear of the shaft, together with the case surrounding the cutters and wings, for enabling them to act as a fan or blower to discharge the shavings; the whole being arranged and operating substantially as set forth."

33. For an *Improvement in Studs for Shirt Bosoms;* James P. Heiss, Philadelphia, Pennsylvania, February 12.

The patentee says,—"My invention consists in a jointed shank or stem composed of two sections, the one of which is fixed to the back of the stud, and projects perpendicularly therefrom, the other is hinged to the former in such manner that it can be turned in line therewith, to allow it to pass through an eyelet hole made in the garment, after which it is turned at right angles to the stationary piece, thus forming a T-head which holds the stud to the garment."

Claim.—"What I claim as new, is constructing the shank in two sections, the first being fixed to, and projecting from, the back of the stud, and the other being hinged to the first in such manner that it can be brought in line with it, or be turned across it, as herein set forth."

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34. For an *Improvement in Elevating and Lowering Carriage Tops;* John L. Allen, Syracuse, Onondaga county, New York, February 19.

The patentee says,—"The nature of my improvement consists in connecting a handle, lever, or any analogous device, upon the inside of carriage tops, with joints or jointed braces upon the outside, by which means the top may be let down or braced up from within."

Claim.—"What I claim as my invention, is connecting a handle, lever, or any analogous device, upon the inside of carriage tops, with joints or jointed braces upon the outside of the same, substantially in the manner and for the purpose set forth above."

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35. For *Adjustable Rollers for Window Curtains;* Edward S. Clark, Suffolk county, Massachusetts, February 19.

Claim.—"What I claim is my improvement in the construction of the curtain roller, whereby I do not only obtain all the advantages of securing the cloth to it by the groove and strip, but am enabled to regulate or adapt the roller to any window of any ordinary width; my said improvement consisting in making the curtain roller and its guide-heads in two parts, in such manner that the grooved section of the roller and one head shall be united together and form a separate part, while the other section or tongue, and the other head, shall also be united and constitute another part, the two being so applied that, when put together, the tongue may be slid or fitted endwise into the groove in manner described; such a combination of the heads and groove, and tongue sections enabling me to cut each section to the length required, and to readily adapt the roller to a window."

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36. For an *Improvement in Lids for Boiler Holes of Cooking Stoves;* Thomas G. Clinton, George H. Knight, and Edward H. Knight, Cincinnati, Ohio, February 19.

The patentees say,—"One part of our invention consists in so connecting the lid or centre plate, as the case may be, by a symmetrical joint with the stove top, as that the lid or centre plate becomes as permanent a fixture to the stove as its oven or fire door, and at the same time fits and fills flush with, or not exceeding the level of the top surface of the stove, the depressions and appendages going to form the joint, whether the lid or connecting plate be thrown on or off the boiler openings.

"Another part of our invention consists in the appendage of a pivot or fulcrum upon which the lid can be rotated, and in so arranging the joint that the lid, when thrown open, can have either its external or flue surface presented uppermost, as may be desired.

"Another part of our invention consists in constructing the lid, with the joint so arranged at the edge of the stove top, that the lid can be manipulated at its coldest point, and by means which present no obstruction to the cooking apparatus; this arrangement also enabling us to dispense with the usual depression for inserting the hook, the said depression being necessarily placed at the hottest part of the lid, and besides this being difficult to mould, and being also objectionable as a receptacle for ashes."

Claim.—"What we claim as new, is, 1st, so arranging the lid or centre plate in connexion with the top plate of the stove, as that the lid or centre plate, when withdrawn from the opening, may be made to add its area to, and at the same time lie flush with, or below, the level of the top of the stove, this being effected by a neck proceeding from the lid or centre plate in the direction of its plane, said neck (whether the lid or centre plate be closed or folded back) fitting and filling a notch in the stove top, and having lugs projecting from its sides, which lugs, bearing upwards against the top plate, or against the shoulders projecting therefrom, sustain the lid when folded back.

"2d, The arrangement substantially as described, of journals on the neck, at or about midway of its length, forming a fulcrum upon which the lid can be folded back, either with its

top face or with its flue face uppermost, the lugs in this case being behind the journals, and midway of the thickness of the neck.

"3d, Constructing the lid or centre plate with a handle projecting therefrom in the direction of its plane, and at its coldest point, so as to afford a means of operating the lid by hand with comparative impunity and facility, and so as to avoid, on the one hand, any impediment to the shifting of the cooking utensils, and, on the other hand, the usual cavity difficult to mould, liable to collect dirt, and placed unavoidably at the hottest part of the lid."

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37. For *Improvements in Raising and Lowering Carriage Tops;* Solomon Goddard and Henry Warfield, Truxton, Cortlandt county, New York, February 19.

The patentees say,—"The nature of our invention consists in so connecting the jointed braces upon the outside of carriage tops at their lower extremities, as that when one of the jointed braces is thrown back, the corresponding one on the opposite side will also be thrown back by the same effort."

Claim.—"All that we claim as of our invention, is connecting the jointed braces upon opposite sides of carriage tops, by means of a shaft or rod passing back of the seat, in such a manner that the braces may be worked simultaneously upon both sides, substantially as herein described."

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38. For an *Improvement in Locking Portable Safes to the Floor;* Henry Hochstrasser, Philadelphia, Pennsylvania, February 19.

The patentee says,—"The nature of my invention consists in making a box with a lock on the lid or front, which box may be attached temporarily or permanently to any desired place, to the bottom of a trunk, for the safe keeping of articles of value, and by the use of the thumb wood screws (which accompany the box for the temporary fastening) the trunk may be secured to the floor, and cannot be removed until the box is unlocked and screws withdrawn; also, can be attached in a few minutes to a bureau drawer, to vessels, railroad cars, &c., affording a safe depository, the usual fastening of trunks, &c., having no real security from burglars and others."

Claim.—"What I claim as my invention, is the device for locking down a portable safe or box to the floor, and at the same time locking the box, as described."

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39. For an *Improved Process of Varnishing Buttons;* Elisha M. Pomeroy, Wallingford, New Haven county, Connecticut, February 19.

Claim.—"What I claim as my invention, is the process of japanning and baking the buttons in bulk, substantially as described, after they have been prepared for the reception of a smooth coat of japan or other varnish, in the manner specified in my former letters patent respectively, or in any other method substantially the same."

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40. For an *Improvement in Portable Fences;* Peter M. Purdy, Haysville, Ashland county, Ohio, February 19.

The patentee says,—"My invention consists in a device for fastening the adjoining ends of fence panels together, which possesses the requisites of durability and cheapness, and can moreover be easily applied to, and disconnected from, the panels."

Claim.—"What I claim as my invention, is fastening together the panels of portable fences, substantially as herein set forth, by means of binding irons and wedges."

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41. For an *Improvement in Hulling Clover Seed;* Allen R. McGriff, administrator of Joseph Pollock, deceased, Richmond, Wayne county, Indiana, February 19.

Claim.—"What I claim as my invention, is the arrangement and combination of the cylindrical cups with each other, for the purpose of discharging the grain at C, and the lighter materials at O, as described."

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42. For an *Improved Method of Kneading Dough;* Henry N. Rider, North Adams, Berkshire county, Massachusetts, February 19.

The patentee says,—"My invention consists in passing the dough alternately in opposite directions beneath a reciprocating breaker, by which the kneading is effectually performed; and also in the various devices by which the several motions of the breaker and kneading table are obtained and regulated."

Claim.—"What I claim as my invention, is the combination of a reciprocating kneading table with a reciprocating breaker, substantially as herein set forth, but irrespective of the devices by which they are severally put in motion."

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43. For a *Breast Plate for Harness;* Joseph R. Sawyer, Templeton, Worcester county, and Sylvanus Sawyer, Monson, Hampden county, Massachusetts, assignees of Orrin Ramsdell, Westfield, Orleans county, Vermont, February 19.

Claim.—"What I claim as my invention, is the centre draft and expansion breast plate for the horse harness, in combination with the use of the double fulcrum self-adjusting pad, applied either to the double or single harness, as set forth."

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44. For an *Improvement in Bedstead Fastenings;* Robert Ramsey, Wilmington, Mercer county, Pennsylvania, February 19.

The patentee says,—"The nature of my invention consists in poviding iron tenons for the rails of a bedstead, and iron mortises for the posts, that connect with each other in the post, and receive the tenons on an inclined plane, so as to fasten the whole bedstead together by the sinking of the rails, without the use of screws or other fixtures on the outside of the posts or rails."

Claim.—"What I claim as my invention, is the employment of bush pieces, locked by the key piece in the manner and for the purpose set forth."

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45. For an *Improvement in Fences;* Isaiah Subers, Philadelphia county, Pennsylvania, February 19.

The patentee says,—"The nature of my invention consists in the method of constructing a fence, the parts of which, when put together, fasten themselves firmly without the use of lead, rivets, screw bolts, wedges, or any other of the modes heretofore adopted for the purpose."

Claim.—"What I claim as my invention, is the method of constructing a self-adjusting and self-fastening fence of any material whatsoever, substantially such as herein described, the parts of which, when put together, fasten themselves firmly by means of a combination of locks and chairs, substantially as described, without the use of lead, rivets, screw bolts, wedges, or any other of the modes heretofore adopted and used for that purpose."

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46. For an *Improvement in Seed Planting Barrows;* Charles A. Wakefield, Essex county, New York, February 19.

Claim.—"What I claim as my invention, is the employment of the gauge plate of variable thickness, in combination with the movable tube, and face plate and its springs, the same being applied to the hopper and conducting tube leading into the furrow opener, and the whole being made to operate substantially as specified."

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47. For an *Improved Seed Planter;* Charles A. Wakefield, Essex county, New York, February 19.

Claim.—"What I claim as my invention, is the combination of the curtain or apron with the cylindrical or broad cast regulator.

"I also claim the manner of constructing the regulator, or in other words, the combination of the prism with the side plates or boards, and their adjusting and confining mechanism, as set forth."

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48. For an *Improvement in Burning Ornamental Figures on Wood;* Hamilton Wood, City of New York, February 19.

The patentee says,—"My improvement consists, first, in the method of constructing the dies or moulds; second, in the treatment of the wood in removing the charred or burnt surface, so as to leave a perfect figure; and third, in the discovery of a peculiar tool or brush as applied thereto."

Claim.—"What I claim as my invention, is, 1st, the method I have described for constructing the mould or dies, so as to allow for the excessive depth they will char the wood in certain parts of figures, in order that the whole figure when finished shall be an exact resemblance of the original.

"2d, I claim the channels, or other like devices, cut in the face of the dies, for escape passages for the gases, smoke, &c.

"3d, I claim the use of an alkaline and acid solution or baths, to aid the removal of the charred surface."

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49. For an *Improvement in Measuring Cloth on Looms;* John W. Robertson and John G. Webster, Lowell, assignees of John G. Webster, Middlesex county, Massachusetts, February 19.

Claim.—"What I claim as my invention, is the arrangement of the roller and clock-work directly upon the breast beam of the loom, and with respect to the cloth or selvage thereof, as specified."

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50. For an *Improvement in Seraphines;* Rufus H. Green, Poultney, Rutland county, Vermont, February 19.

The patentee says,—"The nature of this improvement consists in a new and improved construction of sounding reeds, and an improved mode of applying power to the blowers."

Claim.—"What I claim as new, is, 1st, the combination of wooden sounding reeds with wooden reed plates, constructed in the manner described.

"2d, The combination of the adjustable blocks with the duplicate blowers and the lifting rods, arranged as described.

"3d, The combination of the two sounding boards, and the piano board, with the sounding reeds and keys, arranged in the manner and for the purposes set forth."

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51. For an *Improvement in Machines for Cutting Cap Fronts;* George Burgess, City of New York, February 26.

Claim.—"What I claim as new, is the construction and application of the frame with the blades, and guide pins taking holes in the bed *e*, to work in either direction from the centre, all these parts being constructed and operating substantially as described. And I claim, in combination with the foregoing, the bed *k*, fitted with supporting guide rollers 11 and 12, and adjusting bar 14, with rollers 15, moving over the bar *l*, and taking the indentations, to adjust the position of the material over the cutter blades; the whole constructed and operating substantially as described and shown."

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52. For an *Improvement in Gas Generating Apparatus;* Christopher F. Brown, Baltimore, Maryland, February 26.

The patentee says,—"My improved apparatus and mode of producing gas consists in so arranging a retort for producing an illuminating gas, and adapting a furnace thereto, as to produce a brilliant illuminating gas from rosin, combined with a due proportion of decomposed water charged with carbon."

Claim.—"What I claim as new, is the supply tube combined with the vaporizing cup as herein set forth, for the double purpose of supplying liquid for making gas, and for vaporizing the same before it comes in contact with the decomposing surfaces in the retorts for the purpose set forth. I also claim the compound retort, constructed and arranged as specified."

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53. For an *Improvement in Sofa Bedsteads;* Edwin B. Bowditch, New Haven, Connecticut, February 26.

The patentee says,—"My invention consists in arranging the ordinary seat of a sofa in such a manner as to revolve upon pivots at the ends, in a frame which is hinged to the front of the sofa in such a manner as to be thrown open, and, by revolving the ordinary seat in this frame, bring the stuffed side up, and on a level with another seat or bed placed under the ordinary seat, thereby forming a bed."

Claim.—"1st, What I claim as my invention, is the ordinary seat of a sofa or other suitable article of furniture, so arranged as to revolve on a centre at each end, in a frame so constructed as to turn over and bring the top or stuffed side of the seat (by revolving the same) on a level with another seat or bed placed under the ordinary seat.

"2d, I also claim the use of the stuffed ends forming the support for the top seat when turned over and used as a bed.

54. For an *Improvement in Connecting Hubs with Axles;* Junius Foster, Bridgeport, Fairfield county, Connecticut, February 26.

Claim.—"What I claim as my invention, is enclosing the spring collars, that fit and run in the groove of the axle, within a box at the inner end of the hub, substantially as described, when this is combined with the ring fitting to, and turning on, the outer periphery of the box, and acting on the ends of the spring collars, for the purpose of drawing them out of the groove when it is desired to take off the hub, substantially as described."

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55. For an *Improvement in Churn Dashers;* Isaac D. Garlick, Lyons, Wayne county, New York, February 26.

Claim.—"What I claim as my invention, is the hinging the series of beaters to the dasher rod in such a manner that their faces will be thrown into inclined positions by the upward movement of the dasher, and into horizontal positions by the downward movement thereof, when the said vibrating beaters are combined and act in concert with the series of vertical-faced beaters or wings upon the same dasher rod, substantially as set forth."

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56. For an *Improvement in Iron Railings;* William Hamilton, Philadelphia county, Pennsylvania, February 26.

The patentee says,—"My improvement consists in the construction and combination of the parts forming the joint between the upright paling or rail and the cross bars and string pieces."

Claim.—"What I claim is constructing the palings or upright rails, as described, with holes in them, by means of which they slide freely on the horizontal bars, and with a cavity for containing lead or other proper metal, surrounding said bar, for the purpose of allowing the palings to be placed and fastened at any desired distance from each other, substantially in the manner and for the purpose set forth, by means of which I form a cheap and perfect railing of different lengths with the same number of palings, and firmly secure the rails in place."

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57. For an *Improvement in Clothes Frames;* Humphrey Kempton, Fairhaven, Bristol county, Connecticut, February 26.

Claim.—"What I claim as new, is the combination of the jointed arm, bars, and rods, with the collars and the mast, by means of the stay cords, substantially in the manner and for the purpose herein set forth."

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58. For an *Improvement in Refrigerators;* Ephraim Larrabee, Baltimore, Maryland, February 26.

The patentee says,—"The nature of my invention consists in the arrangement and combination with each other of the water space between the double metallic linings of the preserving chamber, the ice box placed above the preserving chamber, the tube for carrying off the surplus water from the water space, and admitting fresh and cold air to the ice box, and the ventilating tubes for causing a circulation of air between the preserving chamber and the ice box, substantially in the manner described, by means of which the preserving chamber will be kept at a sufficiently low temperature, and the air contained therein be kept pure."

Claim.—"What I claim as my invention, is the inclosing water space for cooling the preserving chamber, in combination with the pipe for discharging the waste water, substantially in the manner described."

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59. For an *Improvement in Scale Beams;* Samuel T. McDougall, City of New York, February 26.

The patentee says,—"The nature of my improvement consists in a combination of two or more scale beams or steelyards, in order that on one of them the weight in units and tens may be indicated, on another the hundreds, and on a third, if necessary, the thousands."

Claim.—"What I claim as my invention, is the combination of two or more scale beams (having fixed and independent points of suspension) with each other at the points where the weight is usually attached, substantially in the manner and for the purpose set forth."

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60. For an *Improvement in Meat Cutting Apparatus;* John G. Perry, South Kingston, Washington county, Rhode Island, February 26.

The patentee says,—"The nature of my invention consists in providing a series of radia-

ting curved knives in a stationary block, and a series of studs, also radiating in a rotating block, and combining the two said blocks together to make the studs act as rakes, to revolve and press the meat, &c., against the knives, to mince the meat, &c., in the manner more clearly explained hereafter."

Claim.—"I claim the studs placed on the bar, in combination with the openings to direct the minced meat, &c., into the said openings: that is, directing the said minced matters into either one of the openings every revolution of the block, to prevent the minced meat, &c., from undergoing re-mincing, as set forth."

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61. For an *Improvement in Distilling Oleaginous Matter;* Anthony M. Poisat and David C. Knab, Paris, France, February 26.

The patentees say,—"Our invention consists, 1st, in combining with a boiler for the distillation of fatty or oleaginous substances a self-feeding apparatus, that the substance to be distilled may be continuously supplied as the distillation proceeds, to avoid the necessity either of repeated re-chargings, and the loss consequent thereon, or to avoid the exposure of the substances too long to the high temperature necessary to the distillation, which has the effect to partly decompose such substances.

"2d, In the distillation of fatty or oleaginous substances in a boiler or boilers, the introduction of jets of steam at or near the bottom of the boiler, to induce the circulation of the substances under treatment, and thereby to carry off more rapidly the volatilized parts, and at the same time to prevent the admission of atmospheric air to the substances under treatment, the introduction of such jets of steam being supposed to have a beneficial chemical effect, although we have not been able to determine this.

"And the last part of our invention consists in using, in combination with an apparatus for the distillation of fatty or oleaginous substances, a lead bath at or near the melting point, interposed between the fire and boiler, to indicate the proper temperature for the distillation of such substances, and at the same time to diffuse and equalize the temperature and prevent any part from being more highly heated than others, and also to prevent any sudden and injurious transition of temperature."

Claim.—"What we claim as our invention, is facilitating and improving the distillation of fatty and oleaginous substances by the introduction of steam at or near the bottom of the boiler containing such substance, substantially as herein described, in combination with the application of external heat as described.

"And we also claim the process, substantially as described, of distilling fatty and oleaginous substances by means of a bath of melted lead, or any alloy which will melt at the same temperature, substantially as and for the purpose described, whereby we are enabled to effect the distillation at the lowest possible temperature, and have a practical indication of such temperature, as described."

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62. For a *Method of Giving a Rotary Motion to Metal in Casting Chilled Rolls;* John C. Parry, Pittsburg, Pennsylvania, February 26.

The patentee says,—"My invention consists in the insertion into the mould in which a roller is cast, of a small cylinder of iron or other metal of a peculiar shape hereinafter described, which is attached to a rod, and placed in such a position inside of the mould, and fronting the mouth of the gate through which the melted metal enters the mould, that the melted metal, after leaving the gate and when it has entered the mould, is diverted from the straight direction with which it entered, and being unable, by the position of the small cylinder with a wing attached to it, (which I shall call a wing-dam,) from running otherwise in the mould than in a circular direction around its circumference, it receives a strong circular motion, which continues until the process of casting is finished."

Claim.—"I claim as my invention the use of the dam attached to the rod placed inside the mould, in chilled rollers and similar castings, as hereinbefore described, for the purpose of producing a circular motion in the melted metal."

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63. For a *Parallelogram Steering Apparatus;* Jesse Reed, Marshfield, Plymouth county, Massachusetts, February 26.

The patentee says,—"My improvement consists in connecting the screw shaft with the rudder post by an arrangement of arms in the form of a parallelogram, and properly jointed to each other, so that the strain in turning the rudder is always in the line of the axis of the shaft, or parallel thereto, and the lateral strain of a heavy sea, &c., is brought near the gudgeon of the shaft, which renders it less liable to breakage, &c."

Claim.—"What I claim as my invention, is a steering apparatus in which the operating screw and nut are connected to, and turn, the rudder post, by means of a series of parallel arms and cross bars, arranged and combined together in the form of a parallelogram, and jointed together so as to turn freely, substantially as described."

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64. For an *Improvement in Stoves;* Peter Sweney, Buffalo, New York, February 26.

The patentee says,—"The nature of my invention consists in dividing the interior of the upper part of the stove into three flues by means of partitions made of cast iron. Also, in introducing a current of atmospheric air into the stove at the lower extremity of the flue W, by means of a funnel-shaped pipe, so that a union is formed between the oxygen of the atmosphere and the hydrogen in the smoke, and combustion is produced by the heat radiating from the partition between the flues, which becomes heated to a temperature of about 1000° Fahrenheit by the action of an ordinary fire thereon."

Claim.—"What I claim as my invention, is the arrangement of the flues W, C, and A, in combination with the funnel-shaped air pipe, in such manner that a union will be formed between the oxygen of the atmosphere and the hydrogen of the smoke at the lower extremity of the flue W, where the heat caused by the action of the fire on the partition between the flue W and the flue C, and radiating from it, will produce combustion of those gases as they ascend through the flue W."

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65. For an *Improved Hydrolator;* Zuriel Swope, Lancaster, Lancaster county, Pennsylvania, February 26.

The patentee says,—"The nature and object of my invention is to first elevate and then to carry water or materials for a distance upon a single or double cord or wire."

Claim.—"What I claim as new, is the combining with a hydrolator, for first elevating water or other substance and then conveying the same to a distance, a double acting drum, constructed substantially as described, in such a manner that the vertical raising and lowering movement of the bucket, or its equivalent, may be at a slow movement and an accelerated leverage, and the horizontal or inclined converging movement may be at an accelerated speed and a diminished leverage."

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66. For an *Improvement in Apparatus for Making Coffee;* Nathaniel Waterman, Suffolk county, Mass, February 26.

The patentee says,—"The nature of my invention consists in combining with the coffee-holder, which, when in use, is placed within the interior of the decoction pot, what I term a spring expander, the object or purpose of the same being to preserve the coffee, when wet, in a close body, and at the same time to afford to it room to expand, without the production of such a condensation of it as would tend to injuriously prevent the flowage or percolation of the water through. Besides this, my invention prevents to a very great degree, if not entirely, the finer particles of the coffee from either being separated from the rest and diffused into the decoction, or settling on the strainer so as to clog the holes thereof, and impede the passage of the fluid or extract through the same."

Claim.—"What therefore I claim as my invention, is the spring expander, in combination with the coffee box or receptacle, the same being for the object or purpose substantially as specified."

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67. For *Improvements in Machinery for Spinning Yarn and Making Rope;* Jesse Carpenter, Hartford, Connecticut, assignee of Cullen Whipple, Providence, Rhode Island, February 26.

The patentee says,—"My invention consists in a machine for the manufacture of cordage, which is also applicable to the manufacture of all kinds of materials from vegetable fibres which require to be formed into twisted threads or yarns; and the novelty of my machine consists in the peculiar manner of laying the said fibres, and the twisting of them, whereby each and every fibre composing any cord is made to bear its exact proportion of strain to resist fracture under tension.

"A second feature of my machine is the method of giving a double twist, first of all, to the strand itself, and secondly to the rope while laying the strands."

Claim.—"What I claim as my invention, is, 1st, giving to the strand, during the operation of spinning, a double twist to each revolution of the rings or flyers, in the manner described herein, the same being applicable to, and claimed in, the spinning of yarns from any fibrous material, and also in laying the strand into rope in the manner set forth.

"2d, I claim the combination of the weights with the bobbin stands, for the purpose of preventing those from being carried around with the rings or flyers; the whole being arranged and operated substantially in the manner and for the purpose described."

Re-issues for February, 1850.

1. For an *Improvement in Curry Combs;* Wm. Beach, Philadelphia, Pennsylvania; patented March 13, 1849, re-issued February 12, 1850.

Claim.—"What I claim as new, is combining the trough-shaped bars, which have the comb-teeth on their edges, with the folded strips of metal, and with the wires running through them, in the manner substantially as herein set forth, so as to form a curry comb with open or hollow back.

"I also claim the shank constructed with the fastening hole therein, made without drilling or welding, and combined with the comb as described, so as to act as guards to the ends thereof."

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2. For an *Improvement in Distilling Apparatus;* Charles A. Krechler, Stockholm, Sweden; patented July 10, 1849, re-issued February 26, 1850.

The patentee says,—"My invention consists in a rectifyer of peculiar construction and arrangement, through which the vapor from the boiler is passed in its way to the condenser."

Claim.—"What I claim as my invention, is the peculiar construction and arrangement of the rectifyer as set forth: that is to say, 1st, constructing the rectifying chambers and water cases with charging hole, substantially as set forth, by which means the various substances employed to rectify or to flavor the spirit, can be easily charged into, or discharged from, any one chamber, without dismounting the apparatus or removing the substances in the other chambers.

"2d, The particular form of the rectifying chambers, which are made of the frustra of two cones united at their bases, the upper forming the condensing surface of the aqueous vapor."

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3. For a *Method of Attaching a Ball to a Cartridge;* William R. Palmer, assignee of Walter Hunt, City of New York; patented August 10, 1848, re-issued Feb. 26, 1850.

The patentee says,—"The nature of my invention consists in making the cartridge of a cylindrical form, of wood or other equivalent substance, bored out or otherwise formed, with the rear end closed except a central hole for the ignition of the charge by the priming, when this is combined with, and attached to, the rear end of a ball by inserting one into the other."

Claim.—"What I claim as my invention, is the method substantially as herein described, of attaching or joining to a ball a cartridge made of wood or other equivalent material, in manner substantially as described."

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4. For a *Loaded Ball;* George A. Arrowsmith, assignee of Walter Hunt, City of New York; patented August 10, 1848, re-issued February 26, 1850.

The patentee says,—"The nature of my invention consists in making balls of metal for fire arms with the rear part thereof cylindrical, and with a cavity of sufficient capacity to receive the entire charge of gunpowder, which is therein confined by a cap or the equivalent thereof, having a central hole through which the charge is inflamed."

Claim.—"What I claim as my invention, is making metallic balls for fire arms with the rear part thereof cylindrical and a cavity in the said cylindrical part of a sufficient capacity to receive the entire charge of gunpowder, substantially as herein described, when the said charge is retained in the ball by a cap or the equivalent thereof, having a central hole through which the charge can be inflamed, substantially as described."

Designs for February, 1850.

1. For a *Design for Stoves;* Peter J. Simmons, Troy, New York, February 5.

The patentee says,—"The distinguishing features consist in the form of the cornice, moulding of the bottom plate, and other mouldings and ornaments as represented."

Claim.—"What I claim is the design and configuration of a cook stove, substantially the same as described."

2. For a *Design for Cooking Stoves;* William C. Davis, assignee of Joseph G. Lamb and Conrad Harris, Cincinnati, Ohio, February 5.

Claim.—"What we claim as our invention, is the combination and arrangement of the panelings, ornaments, mouldings, &c., into an ornamental design for cooking stoves, when constructed, combined, and arranged substantially as represented."

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3. For a *Design for Stoves;* William P. Cresson, assignee of Wm. P. Cresson, David Stuart, and Peter Seibert, Philadelphia, Pennsylvania, February 5; anté dated October 1, 1849.

Claim.—"We claim the ornamental design for a stove called the Cottage Parlor Air Tight, as described."

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4. For a *Design for Stoves;* William P. Cresson, assignee of Stuart, Cresson & Seibert, Philadelphia, Pennsylvania, February 5; anté dated October 1, 1849.

Claim.—"We claim the ornamental design for a stove called a Radiator Screen, as described."

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5. For a *Design for Stoves;* Samuel D. Vose, Albany, New York, February 12; anté dated November 17, 1849.

Claim.—"What I claim is the combination and arrangement of ornamental figures forming respectively the front and side plates of my stove, as described."

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6. For a *Design for Stoves;* Samuel D. Vose, Albany, New York, February 12; anté dated November 17, 1849.

Cloim.—"What I claim is the combination and arrangement of ornamental figures forming respectively the outside plates of my parlor stove, as described."

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7. For a *Design for Stoves;* Samuel D. Vose, Albany, New York, February 12; anté dated November 17, 1849.

Claim.—"What I claim is the combination and arrangement of ornamental figures forming respectively the front, top, and side plates of my stove, as described."

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8. For a *Design for Stoves;* S. B. Sexton & Co., Baltimore, Maryland, assignees of James H. Conklin, Peekskill, Westchester county, New York, February 19.

Claim.—"What I claim is the production of the new design for stoves, as described."

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9. For a *Design for Stoves;* Jeremiah D. Green and George Warren, Troy, New York, February 19.

Claim.—"What we claim is the configuration and arrangement of the ornamental figures on the door panels and feet of the stove, constituting together a design for a stove."

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10. For a *Design for Stoves;* Lathrop S. Bacon, Rochester, New York, February 26.

Claim.—"What I claim is the peculiar form, shape, or configuration of the said stove plate, to be used as the front oven plate to an elevated oven; such shape, form, or configuration being a design independent of any particular ornaments."

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11. For a *Design for Stoves;* Clute & Brothers, Schenectady, assignees of William L. Sanderson, Troy, New York, February 26.

Claim.—"What I claim is the design and configuration of ornaments constituting a parlor stove, substantially the same as described.

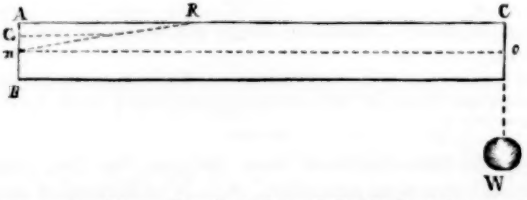
MECHANICS, PHYSICS, AND CHEMISTRY.

Formula for the Strain upon Timber.—Centre of Gravity of an Ungula and Semi-Cylinder. By HERMAN HAUPT, ESQ., *Civ. Eng.*

To the Editor of the Journal of the Franklin Institute.

Dear Sir: About twelve years ago I became very much interested in calculations upon the strength of materials, but my location at that time (as engineer on a small railroad in the interior of the State) not affording me facilities for consulting any of the standard writers whose works might have thrown light upon the subject, I had recourse to experiment and observation, in order to satisfy myself in reference to the mode of distribution of the strains, and to determine the formulæ for calculating their intensities. A little reflection led to the application of a principle which appears to be different from any that has been employed by others for the determination of the ordinary algebraic expressions which represent the strength of different forms of beams, and appears so simple and easy of application, and at the same time so readily deduced from the elementary conditions of resistance, that I will take the liberty of troubling you with a brief explanation of the principle itself, and its application to some of the ordinary cases which occur in practice.

The first fact which has been established in the resistance of beams laid horizontally upon two supports, or fixed at one end and loaded with a weight applied at the other, is, that the fibres on one side are compressed and on the other side extended. It is also a consequence of the elasticity of the material that, within the elastic limits, the resistances to extension and compression must be sensibly equal, and that a certain line exists called the neutral axis, along which neither extension nor compression will be found, and which retains its natural condition. It is also evident that, in a material which is perfectly homogeneous, the strains upon the fibres will vary uniformly from the neutral axis to the most distant fibres. These conditions naturally lead to the following mode of calculation:



Let AC represent a beam fixed at A and loaded with a weight W applied at C, *n o* represents the neutral axis. The fibres on the side *n* A will be extended, and those on the side *n* B will be compressed, and their resistance must be sufficient to keep in equilibrium the weight W.

If ABC represents a section of the beam by a vertical plane, we may conceive the strain upon the fibre AC, or its equivalent resistance, to be represented by some line AR; and as the strain at *n* is nothing, and is supposed to vary uniformly from *n* to A, it follows that if *n* and R be joined,

forming a triangle, the strain upon any intermediate fibre will be represented by the corresponding perpendicular of this triangle, and the whole strain, equal to the sum of all the perpendiculars, by the area of the triangle. The effect of this triangle of resistance would be equivalent to its whole area concentrated at its centre of gravity, and acting with a leverage equal to the distance of this point from the neutral axis.

This principle furnished a key to the solution of all the problems which are presented in calculations upon the strength of materials; it was found to be susceptible of general application. Some of the solutions require the aid of calculus, but in general they are extremely simple. The case of a rectangular beam fixed at the end will serve as an illustration.

Let the maximum strain upon the fibre AC be represented by R. Also,

b = breadth of beam in inches.
d = depth of beam in inches.
l = length in inches.
W = weight applied at C.

The area of the triangle A R $n = \frac{\mathrm{R}\,d}{4}$. The distance G $n = \frac{1}{3}\,d$. The effect of the triangle of resistance will be $\frac{\mathrm{R}\,d}{4} \times \frac{d}{3} = \frac{\mathrm{R}\,d^2}{12}$. The resistance of the fibres n B will be also equal to $\frac{\mathrm{R}\,d^2}{12}$, and the whole resistance will be $\frac{\mathrm{R}\,d^2}{6}$. The effect of the weight W, acting with a leverage l, will be W l, and the equation of equilibrium will be $\frac{\mathrm{R}\,d^2}{6} = \mathrm{W}\,l$.

In this expression the breadth of the beam has not been introduced, the calculations having been made upon a vertical section; but if the breadth be considered, the triangle becomes a wedge, and the centre of gravity remaining at the same distance as before, the only change in the expression results from the introduction of this term, and it becomes—

$$\frac{\mathrm{R}\,b\,d^2}{6} = \mathrm{W}\,l, \quad \text{or} \quad \mathrm{R} = \frac{6\,\mathrm{W}\,l}{b\,d^2},$$

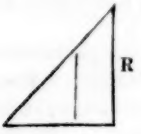
An expression which is identical with those obtained by Tredgold and others by different processes.

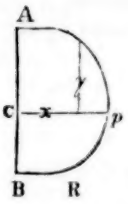
If the beam should be placed in such a position that the diagonal of the cross section would be vertical, the solid which would represent the resistance would become a triangular pyramid, instead of a wedge as in the case just considered.

If the resisting material should be in the form of a cylinder, the case would present greater difficulty, but is susceptible of solution on precisely the same principle, the solid of resistance in this case being an ungula.

As some difficulty was experienced in the solution of this problem, in consequence of my inability to find a demonstration of the manner of determining the centre of gravity of this solid, I will give the process by which I calculated its position. I do not know whether it has been previously ascertained or not, no doubt it has, but it is not to be found in my own or any library to which I have had access.

To find the volume and the position of the centre of gravity of an ungula or solid formed by passing an oblique plane through the diameter of the base of a semi-cylinder.





All the sections parallel to A B will be rectangles, the altitudes of which will be proportional to their distance from C. Hence if R represent the altitude at p, and x = the distance to any section, r = radius, y = ordinate, $r : x :: R : \frac{R\,x}{r}$ = the perpendicular of rectangle, and $\frac{R}{r}\,x\,y$ = area. The elementary solid will be $\frac{R}{r}\,x\,y\,dx$, and its moment $= \frac{R}{r}\,x^2\,y\,dx$. The distance to the centre of gravity will be

$$\frac{\int_r^0 x^2\,y\,dx}{\int_r^0 x\,y\,dx}.$$

1. To determine the volume of the ungula, we have $y = \sqrt{r^2 - x^2}$;

$$\text{Hence, } \int x\,y\,dx = \int (r^2 - x^2)^{\frac{1}{2}}\,x\,dx.$$

$$\text{Make } r^2 - x^2 = z^2,$$

$$\text{Whence } x\,dx = -z\,dz.$$

$$\int (r^2 - x^2)^{\frac{1}{2}}\,x\,dx = -\int z^2\,dz = -\frac{z^3}{3} = \frac{-(r^2 - x^2)^{\frac{3}{2}}}{3},$$

which becomes, when taken between the limits o and r, $-\frac{r^3}{3}$. This negative result does not affect the absolute volume; to interpret it it must be observed that the integral does not become 0 when $x = 0$, but when $x = r$, and consequently the solid lying in the direction of C from p should be negative. $\frac{R}{r} \cdot \frac{r^3}{3} = \frac{R\,r^2}{3}$. The volume of the ungula is, therefore, equal to that of a pyramid whose base is the circumscribing rectangle with the same altitude.

2. $$\int x^2\,y\,dx = \int (r^2 - x^2)^{\frac{1}{2}}\,x^2\,dx = \int \frac{x}{2}\,(r^2 - x^2)^{\frac{1}{2}}\,2\,x\,dx.$$

Integrate by parts making in the formulæ

$$\int z\,dy = z\,y - \int y\,dz \qquad z = \frac{x}{3},\ y = (r^2 - x^2)^{\frac{3}{2}},$$

$$\text{Whence } dy = \frac{3}{2}(r^2 - z^2)\,2\,z\,dz.$$

Substitute these values we obtain

$$\int \frac{x}{2}(r^2 - x^2)^{\frac{1}{2}} 2x\,dx = -(r^2 - x^2)^{\frac{3}{2}}\frac{x}{3} + \frac{1}{3}\int (r^2 - x^2)^{\frac{3}{2}}\,dx.$$

The quantity $(r^2 - x^2)^{\frac{3}{2}}\frac{x}{3}$ will reduce to 0 when $x = 0$ or $x = r$; this term will therefore disappear, and the expression reduces to

$$\int x^2 (r^2 - x^2)^{\frac{1}{2}} dx = \frac{1}{3}\int (r^2 - x^2)^{\frac{3}{2}} dx = \frac{1}{3}\int (r^2 - x^2)^{\frac{1}{2}} (r^2 - x^2)\,dx =$$

$$\frac{1}{3}\int (r^2 - x^2)^{\frac{1}{2}} r^2\,dx - \frac{1}{3}\int (r^2 - x^2) x^2\,dx.$$

Transpose the last term to the first member and reduce

$$\int (r^2 - x^2)^{\frac{1}{2}} x^2\,dx = \frac{1}{4}(r^2 - x^2)^{\frac{1}{2}} r^2\,dx.$$

But the integral $\int (r^2 - x^2)^{\frac{1}{2}}\,dx$, between the limits 0 and r, represents the area of a quadrant $= \frac{1}{4}\pi r^2$.

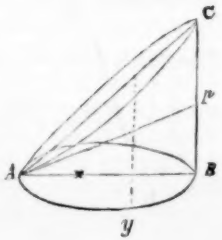
$$\text{Hence } \int (r^2 - x^2)^{\frac{1}{2}} x^2\,dx = \frac{1}{4} r^2 \left(\frac{\pi r^2}{4}\right) = \frac{\pi r^4}{16},$$

$$\text{And } \frac{\int_r^0 (r^2 - x^2)^{\frac{1}{2}} x^2\,dx}{\int_r^0 (r^2 - x^2)^{\frac{1}{2}} x\,dx} = \frac{\frac{\pi r^4}{16}}{\frac{r^3}{3}} = \frac{3}{16}\pi r =$$

distance from the centre of the circle to the perpendicular through the centre of gravity. The line which joins C and the middle point of R, passes through the centres of all the elementary rectangles, and therefore the centre of gravity must be found at the intersection of this line with the perpendicular, through a point at a distance of $\frac{3}{16}\pi r$ from the centre. Its distance from the base is, therefore, the fourth term of the proportion $r : \frac{3}{16}\pi r :: R : \frac{3}{16}\pi R$. The substitution of this value in the general formula will give, for the resistance of a cylinder laid horizontally, the same results that have been obtained by other processes. The subject will be concluded with one more problem similar to the preceding, which is also useful in the determination of the formulæ for the resistance of solids.

To find the volume and centre of gravity of a semi-cylinder, cut off by an oblique plane passing through the edge of the base.

Let r = radius, x = any abscissa, y = the corresponding ordinate of the circle.



Then $2r : x :: R : \frac{R}{2r}x$ = perpendicular of elementary rectangle.

$\frac{R}{2r}x.\,2y$ = area $= \frac{R}{r}xy$. $\quad \frac{R}{r}xy\,dx$ = elementary solid. $\quad \frac{R}{r}y x^2\,dx$ = moment of elementary rectangle.

But from the equation of the circle we have $y = \sqrt{2rx - x^2}$.

$$\int \frac{R}{r} x\, y\, dx = \frac{R}{r} \int (2rx - x^2)^{\frac{1}{2}} x\, dx.$$

Make $(r - x) = z$, $dx = -dz$, $2rx - x^2 = r^2 - z^2$.

Substitute these values we obtain

$$\frac{R}{r} \int (2rx - x^2)^{\frac{1}{2}} x\, dx = \frac{R}{r} \int (r^2 - z^2)^{\frac{1}{2}} (r - z)(-dz) =$$

$$-\frac{R}{r}\left[\int (r^2 - z^2)^{\frac{1}{2}} r\, dz + \int (r^2 - z^2)^{\frac{1}{2}} z\, dz\right]$$

The first of these integrals, taken between the limits $+r$ and $-r$, is the area of a semicircle, and is consequently equal to $\frac{\pi r^2}{2}$; hence the value of the first term becomes $\frac{\pi r^3}{2}$.

The second term becomes $\frac{(r^2 - z^2)^{\frac{3}{2}}}{3}$, (see demonstration of ungula,) and is equal to 0 when $z = +r$, or $z = -r$. It therefore disappears, and the volume of the solid becomes $-\frac{R}{r} \cdot \frac{\pi r^3}{2} = -\frac{1}{2} \pi r^2 R$, a result which is evidently correct, since the volume is half that of the cylinder, $\pi r^2 R$.

To find the distance to the centre of gravity, we must divide the integral of $\frac{R}{r} y x^2 dx$ by the volume. Making similar substitutions to those used in finding the volume, we obtain $\frac{R}{r} \int y x^2\, dx =$

$$\frac{R}{r} \int (r^2 - z^2)^{\frac{1}{2}} (r - z)^2 (-dz) = \frac{R}{r} \int (r^2 - z^2)^{\frac{1}{2}} (r^2 - 2rz + z^2)(-dz) =$$

$$-\frac{R}{r}\left[r^2 \int (r^2 - z^2)^{\frac{1}{2}} dz - 2r \int (r^2 - z^2)^{\frac{1}{2}} z\, dz + \int (r^2 - z^2)^{\frac{1}{2}} z^2\, dz\right]$$

The first of these integrals is a semicircle, hence $r^2 \int (r^2 - z^2)^{\frac{1}{2}} dz = r^2 \frac{\pi r^2}{2} = \frac{\pi r^4}{2}$.

The second, $\int (r^2 - z^2)^{\frac{1}{2}} z\, dz$, as we have seen, becomes $= 0$.

The third, $\int (r^2 - z^2)^{\frac{1}{2}} z^2\, dz$, was found in the problem of the ungula to be $\frac{1}{4} r^2 \int (r^2 - z^2)^{\frac{1}{2}} dz$, which, between the limits $+r$ and $-r$, becomes $\frac{\pi r^4}{8}$.

The whole expression therefore becomes

$$\frac{R}{r}\int y x^2 dx = -\frac{R}{r}\left(\frac{\pi r^4}{2} + \frac{\pi r^4}{8}\right) = -\frac{5}{8}\pi R r^3,$$

$$\text{And } \frac{\frac{R}{r}\int y x^2 dx}{\frac{R}{r}\int y x dx} = \frac{-\frac{5}{8}\pi R r^3}{-\frac{1}{2}\pi R r^2} = \frac{5}{4} r.$$

Hence the line through the centre of gravity, perpendicular to the base, passes at a distance of $\frac{1}{4} r$ from the centre. The centre of gravity will be found in this line, and also in the line drawn from A to the middle point of B C. Hence it will be at their intersection, and its height above the base can be found by the proportion $2r : \frac{R}{2} :: \frac{5}{4} r : \frac{5}{16} R$.

HARRISBURG, April 29, 1850.

For the Journal of the Franklin Institute.

Notice of a Meteor.

A meteor of uncommon brilliancy was seen on the night of the 11th of May, at 18 minutes past 11 o'clock. Its path appeared to be nearly parallel to the plane of the ecliptic. When first observed it was in proximity with β Virginis, and it disappeared behind a building when close to Regulus; the part of its course seen having been about 2° of arc, and the time occupied, as near as could be judged, 1½″. Its brilliancy was much greater than that of Jupiter, which was in the vicinity. Its shape was that of a globe whose diameter was about three times the apparent diameter of Jupiter, followed by a trail of a length about equal to the diameter of the globe. The general color was a brilliant white, shaded with green and red at the margin and extremity of the tail. J. C. C.

For the Journal of the Franklin Institute.

Atlantic Steam Navigation.

"WHEN GREEK MEETS GREEK, THEN COMES THE TUG OF WAR."

The present time is particularly interesting to all who feel an interest in American Steam Navigation. The "Atlantic" has made her first passage to Liverpool, and although retarded for about 36 hours by accidents, has still made respectable time. It is a great misfortune that all our steamers are hurried off before being fully tried; they are advertised two or three months in advance, and are started off at the exact time, finished or not, and that important maxim of the late Col. Crocket, "Be sure you're right, *then* go ahead," is entirely forgotten; and, although everything is at stake, the reputation both of builders and vessel is often sacrificed for want of a complete and thorough trial. The fact that as builders of marine engines we are young, is entirely overlooked, and with the confidence of youth we

assume positions which on trial fail, and we again press on to some other point, and are again deceived.

All must remember with what a flourish of trumpets the steamers "Washington" and "United States" were heralded forth, and yet those vessels never possessed powers superior to the Cunard line,—never came up to them; and for those steamers to have made quicker trips across the Atlantic, it would have been necessary for them to have procured a dispensation of the known laws of Nature in their especial favor. No reasonable man, free from prejudice, could, at any time before or after their completion, demonstrate that they ought to beat the Cunard line, and the hopes that were excited, and the money that was lost, were all owing to the fact that passion assumed the reins and reason was left out of the case entirely. We forget that the opponents against whom we contend are not men but machines,—that the elements they operate with will do as much for them as for us. They use the same coal and water, have the same fair and head winds, plough the same ocean, and run the same distance. We have always overestimated ourselves and underrated our opponents.

With the formation of the Collins line of steamers reason returned, and although they may not have fully considered all the points in the case, (and I think they have not,) still I believe they earnestly desired to do so, and in building their present ships, the "Atlantic" and "Pacific," they have availed themselves of the experience of the past and the reason of the present, and have put on the ocean two steamers of great beauty of model and matchless strength. The exquisite taste displayed in their cabins, and in all the internal arrangements which conduce so much to the comfort and happiness of those on board, is not to be surpassed. With machinery of great power, and with boilers of great economy, success may be considered certain, and I fully believe that the reasonable expectations of those interested will be gratified; but when these vessels were designed the fastest steamers of the Cunard line were the "Niagara," "Europa," "Canada," and "America;" to surpass these was all that at that time was considered, but since their commencement, and after all their proportions were settled, two steamers, the "Asia" and "Africa," are commenced on the opposite side, and one of these vessels is now ready for sea; and it will therefore be seen that, supposing them to be victors over the field as it exists to-day, one month will bring into action new opponents of larger size and greater power than those before in use, and what might have been a settled question in the minds of many now becomes doubtful to those who think and reflect for themselves, and it is to this point that I wish to draw attention.

The "Atlantic" and "Pacific" are 290 feet on deck, 46 feet beam, and 32 feet hold; have each two engines of 95 inches diameter of cylinder and 9 feet stroke. The "Asia" and "Africa" are reported 500 tons less in size,—are shorter, narrower, and of less depth. I have not their exact dimensions, but they are no doubt at least 500 tons smaller, and have each two engines with cylinders 96 inches diameter and 9 feet stroke;—with less size they have greater power. Now if we suppose that each are equal as regards model and consumption of fuel, the smaller vessel having the least resistance must be the fastest. But I will assume that the Collins vessel have finer models below water, and will burn less fuel and conse-

quently carry less coal; if so, then the difference of power may be compensated by these advantages in fair weather. But while in fair weather the increased size of the ship, which is principally above water, gives but little resistance, in head winds the sum of all the resistance is what we have to contend with, and such being the fact, I can see no reason why the "Atlantic" and "Pacific" should beat the "Asia" and "Africa," but, on the contrary, I fear the reverse. I should rejoice to have it otherwise, for as sure as the course of empire tends to the West, so surely will we eventually triumph. My position then is, that, while it is possible for the "Atlantic" and "Pacific" to equal or even to excel the "Asia" and "Africa" in fair weather, with head winds the latter will excel. FULTON.

For the Journal of the Franklin Institute.

A New Method of Determining Uranium in its Ores. By AD. PATERA. *Communicated by* THEO. F. MOSS, *Mining Engineer.*

A weighed quantity of the ore is dissolved in nitric acid, filtered from the residuum, and then saturated with an excess of carbonate of potash, whereby the uranium remains in solution as neutral uranate of potash, with arsenic and sulphuric acids when these are present. All the other metals in combination are precipitated as carbonates and separated by filtering. The soluble neutral uranate of potash is then boiled in a gilt silver vessel, whereby acid uranate of potash is formed, which is insoluble in water and is easily washed, and from which the quantity of uranium can easily be determined. This method is capable of technical application.

For the Journal of the Franklin Institute.

A Trip around Cape Horn by the Steamer "Tennessee."

The steamer "Tennessee," formerly running from New York to Savannah, was purchased last fall by Howland & Aspinwall for their Pacific line. She left New York deeply loaded with coal on the 6th of December last, crossed the Equator on December 23d, at 12 o'clock, and arrived at Rio de Janeiro on the 31st,—time from port to port 25 days; was detained in port 14 days taking in coal and stores. Left Rio on the 14th of January, for Valparaiso viâ the Straits of Magellan; on the 21st was visited by a violent gale of wind which lasted for two days, during which time but 42 miles headway was made. On the 27th made the white cliffs of Cape Virgius, and the shoal called the Bank of Sanniento, where the tide rises 36 feet; put to sea that evening and returned next morning and entered Possession Bay, and anchored 30 miles up. While here another severe gale came on, and the engine was worked slowly ahead to relieve the anchor. On the 31st weighed anchor and proceeded 20 miles further up the Bay. On weighing anchor the windlass gave way, and the ship was detained until February 3d, when she started for the Straits. On the passage through, the steamer lost several days at Borja Bay, where she anchored on account of the stormy weather. Left there on February 9th,

and arrived at Valparaiso on the 16th, where she remained 10 days; left on the 26th, and arrived at Panama on the 12th of March.

The "Tennessee" is about 200 feet long, 35 feet beam, and 21½ feet hold. One side lever engine, with cylinder 75 inches diameter and 8 feet stroke; water wheel 32 feet diameter and 7½ feet face. Number of revolutions from New York to Rio 443,931, and from Rio to Valparaiso 320,251. Machinery built by Stillman, Allen & Co., Novelty Works, New York.

B.

FRANKLIN INSTITUTE.

Proceedings of the Stated Monthly Meeting, May 17th, 1850.

Samuel V. Merrick, President, in the chair.
Thomas Fletcher, Vice President.
Isaac B. Garrigues, Recording Secretary.
John F. Frazer, Treasurer.

The minutes of the last meeting were read and approved.

A letter was read from The Royal Geographical Society, London.

Donations were received from The Royal Geographical Society, and The Chemical Society, London; Charles F. Loosey, Esq., Vienna; Hon. A. C. Green, U. S. Senate; Hon. Joseph R. Chandler, U. S. Congress; Hon. W. Jackson, Boston, Mass.; Thos. H. Forsyth, Esq., Pennsylvania Senate; Chas. E. Smith, Esq., Thos. U. Walter, Esq., Philadelphia.

The periodicals received in exchange for the Journal of the Institute were laid on the table.

The Treasurer read his statement of receipts and payments for the month of April.

The Board of Managers and the Standing Committees reported their minutes.

The Board of Managers reported that they had elected V. De Amarelli, P. D., LL. D., of Rossena, Professor of Literature in the Royal Lyceum of Naples, a corresponding member of the Institute.

Prof. Frazer read the report of a Special Committee appointed by the Board of Managers, on the subject of Mrs. Sarah Peter's proposition for a School of Design for young women, referred to the Board of Managers by the Institute at their last meeting.

The Chairman of the Committee on Exhibitions reported that the Committee had instructed him to recommend the Institute to hold an Exhibition of American Manufactures next Fall.

Prof. Frazer read the report of a Sub-Committee, appointed by the Committee on Exhibitions to examine whether the goods (papier maché) exhibited by Mr. Daniel D. Dick at the last Exhibition were made and finished by him, to which was appended the following resolution, which was adopted by the Committee on Exhibitions:

Resolved, That the Committee on Exhibitions have received satisfactory evidence that the goods exhibited at the late Exhibition by Mr. Daniel D. Dick, were made by him, or by his workmen, under his direction, and they therefore award a Recall First Premium to Mr. Dick for the same.

On motion, it was

Resolved, That a Committee of Five be appointed to examine and report upon the mode in which the Franklin Institute can best forward the project of a School of Design for young women.

To which the President was added as Chairman. Committee.—Messrs. S. V. Merrick, Jno. F. Frazer, Dr. Chas. M. Wetherill, Thos. U. Walter, Fred. Fraley, D. S. Brown.

On motion, the Committee on Exhibitions were instructed to take the necessary steps to hold an Exhibition of American Manufactures next Fall, agreeably to their recommendation this evening.

New candidates for membership in the Institute (7) were proposed, and those proposed at the last meeting (4) were elected members of the Institute.

Prof. Frazer read to the meeting a letter from Prof. F. A. Wylie, of the University of Indiana, announcing the discovery of gold in the vicinity of that place, and exhibited specimens of the gold, and of the black sand in which it is found.

"The gold has been found in the beds of the rivulets in Morgan county, about twenty miles north-east, in Jackson county, about twenty miles south-east, in Brown county, about twenty miles east, and in Green county, about fourteen miles west, of Bloomington, as well as at certain intermediate points, but not in the immediate vicinity. Where it has been found it is always in connexion with a black sand which the *washers* call '*emery*.' This sand is found at the bottom of the streams, usually at the upper end of the sand-bars, or on the margins of the streams where there is a sudden turn, and in such places as it would be naturally deposited on account of its density. The coarse gravel is sifted and washed in the usual way until nothing remains but the dense black sand. On examining closely with the microscope, there are to be perceived interspersed through it red particles of different shades, and some few yellow and green particles; of the red particles some appear to be merely colored quartz, while others are plainly distinguished by their crystalline form as garnets, and some of the darkest probably pyrope. The black particles are readily separated into two sorts by the magnet. Those attracted by the magnet, which amount in some specimens to five per cent. of the whole, are evidently *magnetic oxide of iron*. The remaining black grains agree precisely with Dr. Thompson's description of *Titanate of Iron* or *Menachanite*." The gold is in flat scales, a good deal resembling in its appearance that from California.

Prof. Frazer remarked that, from the account of Prof. Wylie, it did not appear that this new gold field was likely to prove profitable in the working, but it was of great interest, both in a geological and mineralogical point of view, and gave rise to an interesting inquiry as to the original locality of the minerals associated with the gold, since they are of a nature inconsistent with the rock formations of that portion of the United States.

Mr. Smith presented Harris' Patent Brake, designed for hoisting machines, cars, and trucks. In this invention the friction plates act on flanches at each end of the shaft, and are drawn together by twisting the rods to which they are connected, the power being applied through a series of levers.

Mr. M. T. W. Chandler remarked that he had seen a similar contrivance applied to stages at Delhi.

Mr. C. Shaw exhibited a Camp Chest, invented by Shaw & Stallcup. This chest may be converted into a table, chair, or settee, for two or three persons, single or double bed, &c. It contains a writing desk, drawers for clothing, papers, and a toilet drawer; a cook stove, summer baker, wash boiler, coffee pot, six cups, six plates, knives, forks, spoons, cannisters, &c., &c. The whole is covered with tarpaulin. The entire chest of a size for two persons measures 3 feet × 2 × 2; if for one person, 2 feet × 2 × 2. The larger weighs 120 lbs., the smaller 100 lbs.

Mr. Seth E. Winslow exhibited and explained to the members present a model of his patented substitute for the pulleys and weights of windows. It consists of a spring attached to the side of a window sash, upon which a roller runs. When the window is hoisted the roller does not bear against the window frame, and hence the window may be easily raised; but when the sash tends to descend, the roller runs along the spring and is pressed against it, so as to hold the sash firmly in its place. A simple modification locks the window sashes when both in place, so as to prevent the window from being hoisted from the outside.

Mr. B. H. Bartol made some interesting remarks in relation to Pirsson's Fresh Water Condenser, now in use on board the steamer "Osprey." The peculiar feature of this condenser, which distinguishes it from all others previously known to the public, is the placing of the condensing tubes horizontally within the ordinary shower condenser, which is made of enlarged dimensions for the purpose. By this arrangement, the water required for condensation is admitted through the ordinary injection cock, and rises to the top of the external condenser, where it is discharged on a scattering-plate, from whence it passes directly on to the tubes of the internal condenser, which are below it and arranged in three ranges or sets, one above the other; the steam from the cylinder is admitted into the upper range, and passes through the three before being discharged at the bottom. The fresh water produced by the condensation of the steam is pumped out by a small pump and immediately returned to the boilers, while the water used to produce condensation is taken out by the air pump of the engine. The internal condenser is not attached to the external one, but merely laid in it. The three ranges are separately made, and the outlet from the upper slips loosely into the one below it, so that when the whole internal condenser is together, it may be moved from $\frac{1}{8}$ in. to $\frac{1}{4}$ in. in any direction. This freedom prevents any liability to fracture from unequal expansion, and the tubes being in vacuum relieves them from all pressure. As the condensing water reaches the bottom of the tubes it is immediately pumped out, so that there is not at any time any water around the tubes other than the thin sheet passing over their surfaces. On the "Osprey," the vacuum within the tubes of the internal condenser is 26 inches, and the same in the external one; the internal vacuum is the result of condensation, while the external vacuum is produced by the air pump. The "Osprey" has made three passages, or 2750 miles in all, and has no trouble in keeping a full supply of fresh water in her boilers.

INDEX.

LIST OF AMERICAN PATENTS, WITH REMARKS, &c.

May, 1849.		Page.
1. Improvements in Locomotives,	Richard H. Emerson,	13
2. —— Tables for Ships' Cabins,	William N. Boggs,	ib.
3. —— Calculating Machines,	William M. Haines,	14
4. —— Printing Paper Hangings,	W. M. Shaw and Ezra Gould,	ib.
5. —— Trusses,	G. A. Smith, assignee of A. Smith,	15
6. —— Artificial Teeth,	Henry Lawrence,	ib.
7. —— Education Tables,	Edwin Allen,	ib.
8. —— Filtering Diaphragms,	William H. Jennison,	16
9. —— Door Locks,	L. R. Livingston, J. J. Roggen & C. Adams,	17
10. —— Gold Washers,	Lewis Jennings,	ib.
11. —— Churn Dashers,	Josiah A. Gridley,	ib.
12. —— Making Mats,	D. Hodgman and A. D. Wyckoff,	18
13. —— Wire Strengthened Spoons,	William Mix,	ib.
14. —— Valve Seats for Water Mains,	Theodore R. Scowden,	ib.
15. —— Cast Iron Car Wheels,	Isaac Van Kuran,	ib.
16. —— Easy Chairs,	Augustus Clark,	19
17. —— Rock Drilling,	J. N. Bolles and H. G. Knight,	ib.
18. —— Flour for Bread Making,	J. Fowler, assignee of H. Jones,	ib.
19. —— Jointing and Cutting Staves,	Charles Mowry,	20
20. —— Electric Telegraphs,	Samuel F. B. Morse,	ib.
21. —— Corn Shellers,	D. O. Prouty and E. Whitman,	ib.
22. —— Sausage Machines,	Thomas Lockett,	21
23. —— Broom Brushes,	Agdalena S. Goodman,	ib.
24. —— Spring Rake Teeth,	Lyman Baker,	ib.
25. —— Trusses,	Lewis A. Hall,	22
26. —— Washing Machines,	S. Munson and W. H. Pratt,	ib.
27. —— Railroad Switches,	Lucius B. Woods,	ib.
28. —— Lugs, &c., for Connecting Pipes,	Chapman Warner,	ib.
29. —— Operating Railway Switches,	W. C. Hicks,	23
30. —— Alcoholic Drinks,	John Hopkins,	ib.
31. —— Daguerreotype Apparatus,	W. & W. H. Lewis,	ib.
32. —— Saw Mills,	Lemuel Hedge,	ib.
33. —— Bedsteads for Invalids,	Francis M. Webster,	24
34. —— Destroying Weevils in Grain,	William Watson,	ib.
35. —— Spooling Yarn,	George H. Dodge,	25
36. Working Lumber into Irregular Forms,	Rufus Powers,	ib.
37. Improvement in Sewing Machines,	Jotham S. Conant,	ib.
38. —— Headers in Bolt Machines,	D. L. Weatherhead,	ib.
39. —— Sewing Machines,	John Bachelder,	26
40. —— Patterns for Castings,	Theodore G. Bucklin,	ib.
41. —— Laying Rope,	Martin Guild,	ib.
42. —— Annunciators for Railway Carriages,	Mason H. Ford,	ib.
43. —— Dressing Staves,	Hervey Law,	27
44. —— Cutting Soles for Boots, &c.,	Abram D. Boynton,	28
45. —— Tarring Rope Yarns,	W. Montgomery and G. H. Williams, Jr.,	ib.
46. —— Combustion of Fuel,	S. G. Fisher, assignee of R. Coad,	29
47. —— Cutting, &c., Cheese Hoops,	E. & T. Ring, assignees of P. Bryant,	ib.
48. —— Rotary Engines,	B. Gould, assignee of J. W. Webb,	ib.
49. —— Chimney Caps,	Charles K. Scudder,	30
50. —— Harvesters,	J. L. & H. K. Fountain,	ib.
51. —— Bedstead Fastenings,	James Brooke,	ib.
52. —— Grain Separators,	Homer Smith,	ib.
53. —— Locks for Fire Arms,	Jacob Post,	31
54. —— Straw Cutters,	Jonathan White,	ib.
55. —— Window Blinds,	Cheney Reed,	ib.
56. —— Packing of Rotary Pumps,	Albigence W. Cary,	ib.

57.	Improvement in Atmospheric Churns,	J. C. Coult and A. B. Davis,	32
58.	—— Spike Machines,	N. Richards and L. C. Alexander, assignees of A. M. George and E. Brown,	ib.
59.	—— Boring and Mortising Machines,	Chandler Carter,	ib.
60.	—— Bench Planes,	C. S. Beardsley and S. Wood,	33
61.	—— Drop Shot,	David Smith,	ib.
62.	—— Speeder Flyers,	Theodore T. Abbot,	ib.
63.	—— Disk Cut-Off Valves,	William M'Cammon,	34
64.	—— Cotton Gins,	William Y. Layton,	ib.
65.	—— Mill Shafting,	Edward Bancroft,	ib.
66.	—— Hames,	Joseph W. Briggs,	35
68.	—— Opening, &c., Blinds,	Wesley Chase,	ib.
69.	—— Keyhole Protector,	Edward Kershaw,	ib.
70.	—— Propelling by Reaction,	Morris W. Ruthven,	36
71.	—— Lifting Vessels over shoals,	Abraham Lincoln,	ib.
72.	—— Jointing Staves,	William H. Seymour,	ib.
73.	—— Imitations of Marble,	Samuel W. Davis,	ib.
74.	—— Spring Saddles,	J. Rhoades and W. Pouley,	37
75.	—— Shanks for Door Knobs,	Joshua Laird,	ib.
76.	—— Scythe Nibs,	David Sawyer,	ib.
77.	—— Harvesters of Clover Heads,	John Hinton,	38
78.	—— Harvesting Machines,	Alfred J. Purviance,	ib.
79.	—— Buckles for Harness,	Hiram Todd,	39
80.	—— Cooking Stoves,	Daniel Dunham,	ib.
81.	—— Cooking Stoves,	Horace Halbert,	ib.
82.	—— Winches,	Charles Perley,	ib.
83.	—— Cutting Welts for Shoes,	Charles Rogers,	40
84.	—— Handles of Table Cutlery,	David N. Ropes,	ib.
85.	—— Bedstead Fastenings,	Devolt Stoltemeyer,	ib.
86.	—— Boring Machines,	William H. Willcox,	ib.
87.	—— Stops for Carpenters' Benches,	L. Augur and J. L. Lord,	41
88.	—— Pumps,	George W. Fulton,	ib.
89.	—— Looms,	John Wilson,	ib.
90.	—— Gates,	Lorenzo Smith,	ib.

RE-ISSUES.

1.	Improvement in Floating Dry Docks,	John Thomas,	ib.
2.	—— Hot Air Registers,	Charles F. Tuttle,	42
3.	—— Atmospheric Churn Dashers,	C. J. Anthony, assignee of N. Chapin,	ib.

DESIGN.

1.	For Stoves,	Morrison & Tibbitts, assignees of A. Haney,	43

June, 1849.

1.	Improvement in Brakes for Carriages,	Gideon Griest,	87
2.	—— Cockeyes for Harness,	F. P. Taylor, assignee of J. W. Briggs,	88
3.	—— Raising Bricks, Mortar, &c.,	J. & J. Pringle, assgnees of James Cox,	ib.
4.	—— Ivory Fine Tooth Combs,	F. Bush and J. H. Pratt,	ib.
5.	—— Railroad Turnout,	Carlton Dutton,	ib.
6.	—— Bee Hives,	Arza Gilmore,	ib.
7.	—— Trap, and Setting it,	Thomas A. Davis,	89
8.	—— Tent Frames,	Jesse E. Dow,	ib.
9.	—— Grain Drills,	Edward Steacy,	ib.
10.	—— Windmills,	Charles B. Hutchinson,	ib.
11.	—— Parlor Cooking Stoves,	Edward R. Brown,	90
12.	—— Pumps,	Downs, Mynderse & Co., ass'es of B. Holly,	ib.
13.	—— Corn Ploughs,	Stephen Coats,	ib.
14.	—— Metallic Alloys,	Herman B. Babcock,	ib.
15.	—— Consumption of Fuel,	Christian Burckhardt,	91
16.	—— Seed Planters,	James D. Willoughby,	ib.
17.	—— Smut Machines,	Joseph Hëygel,	ib.
18.	—— Sun Dials,	James Scott,	ib.
19.	—— Steering Apparatus,	Jesse Reed,	92
20.	—— Subsoil Corn Ploughs,	Henry Bacon,	ib.
21.	—— Shank Painter Stopper,	Charles Perley and Joshua Terry,	ib.
22.	—— Chills for Casting Files, &c.,	Ezra Ripley,	ib.
23.	—— Cultivators,	George W. Brown,	93

24.	Improvement in Shoulder Braces,	Samuel S. Fitch,	93
25.	—— Operating Railroad Gates,	Richard Coffin,	ib.
26.	—— Gun Locks,	William W. Marston,	ib.
27.	—— Boom Derrick,	George E. Warner,	94
28.	—— Seed Planters,	David Deihl,	ib.
29.	—— Harvesters,	Nelson Platt,	ib.
30.	—— Harness Saddles,	Joseph W. Briggs,	95
31.	—— Steam Pipes for Sugar Boiling,	Alfred Stillman,	ib.
32.	—— Drill Barrows,	George Colby,	ib.
33.	—— Cutting Out Felloes,	J. & L. Adams and L. H. Moore,	ib.
34.	—— Padlocks,	F. C. Goffin and C. Liebrich,	96
35.	—— Barrel Machinery,	Reuben Murdock,	ib.
36.	—— Trucks for Railroad Cars,	Isaac Knight,	97
37.	—— Wheels of Horse Powers,	John A. Taplin,	ib.
38.	—— Corn Shellers,	Jacob Mumma,	98
39.	—— Churns,	Chapman Warner,	ib.
40.	—— Musical Notation,	Ernest Von Heeringen,	ib.
41.	—— Inhalers or Lung Protectors,	Lewis P. Haslett,	99
42.	—— Cooking Stoves,	Jordan L. Mott,	ib.
43.	—— Reed Musical Instruments,	B F. Blodget and H. B. Horton,	ib.
44.	—— Washing Machines,	Daniel L. Walker,	ib.
45.	—— Sculling Propellers,	Alexander Bond,	100
46.	—— Cooking Stoves,	Ebenezer F. Martin,	ib.
47.	—— Gold Washers,	William Ball,	ib.
48.	—— Grain Drills,	Aaron Palmer,	ib.
49.	—— Gun Locks,	F. Goodell, assignee of T. W. Harvey,	101
50.	—— Churns,	Geo. E. Gill and Jos. B. Tillinghast,	ib.
51.	—— Carding Machines,	John M'Carty,	ib.
52.	—— Carriers for Harvesting Machines,	J. J. & H. F. Mann,	ib.
53.	—— Coal Grates,	John F. Weishampel,	102
54.	—— Seed Planters,	Edmund Myers,	ib.
55.	—— Melodeons,	Charles Austin,	ib.
56.	—— Atmospheric Churns,	Samuel P. Francisco,	ib.
57.	—— Winnowing Machines,	Benjamin D. Saunders,	ib.
58.	—— Dampers for Stoves,	Benson Owen,	103
59.	—— Cooking Stoves,	Roswell Wilson,	ib.
60.	—— Signals, &c., on Railroads,	Kelly & Harper, as'es of J. W Hoffman,	ib.
61.	—— Door Holder,	Edmund Morris,	ib.
62.	—— Drying Grain,	Joseph H. Patten,	104
63.	—— Harness for Horse Rakes,	Warren Parker,	ib.
64.	—— Seats for Railroad Cars,	Mowry & Hyde, assignees of A. W. Snow,	ib.
65.	—— Hill Side Ploughs,	Daniel Robb,	105
66.	—— Animal Traps,	James Thomas,	ib.
67.	—— Permutation Locks,	H. C. Jones, assignee of H. Ritchie,	ib.
68.	—— Churns,	Z. C. Robbins,	106
69.	—— Extension Tables,	Thomas P. Sherborne,	ib.
70.	—— Teaching Music,	E. Von Heeringen,	ib.
71.	—— Spark Arresters,	James A. Cutting,	107
72.	—— Harvesters,	Pells Manny,	ib.
73.	—— Locomotive Engines,	L. B. Tyng, assignee of T. Perkins,	108
74.	—— Attaching Harrows to Ploughs,	Jacob Stroop,	ib.

ADDITIONAL IMPROVEMENT.

1.	Improvement in Locks,	L. R. Livingston, J. J. Roggen & C. Adams,	ib.

RE-ISSUES.

1.	Improvement in Cooking Stoves,	R. D. Granger, assig'e of Johnson & Cox,	109
2.	—— Screw Wrenches,	Loring Coes,	ib.

DESIGNS.

1.	For Stoves,	A. Quackenboss ass'e of S. W. Gibbs,	110
2.	Do.	Charles W. Warnick,	ib.
3.	Do.	Samuel H. Ransom,	ib.
4.	Do.	Do.	ib.

July, 1849.

1.	Improvement in Centripetal Presses,	James E. Serrell and David Smith	ib.

2.	Improvement in Cooking Stoves,	W. E. & H. Bleecker & S. D. Vose,	111
3.	—— Musical Instruments,	J. Alley and H. W. Poole,	ib.
4.	—— Bags and Sacks,	William B. Carlock,	ib.
5.	—— Cutting Veneers,	Benjamin S. Stedman,	112
6.	—— Jointing Staves,	Lewis S. Chichester,	ib.
7.	—— Winnowing Machines,	John W. Fisk,	ib.
8.	—— Self-Acting Mules,	Ebenezer C. Sanger,	113
9.	—— Windmills,	E. & E. Gore,	ib.
10.	—— Spindles and Flyers,	Wm. Mac Lardy and Jos. Lewis,	114
11.	—— Shrinking Iron Bands,	William Massey,	ib.
12.	—— Washing Machines,	Thomas King,	ib.
13.	—— Buckles to Suspenders,	John Abernethy,	ib.
14.	—— Bee Hives,	George Wheeler,	115
15.	—— Washing Machines,	Lewis W. Colver,	ib.
16.	—— Bolt and Rivet Machines,	J. L. Kingsley, assignee of J. G. Day,	ib.
17.	—— Picking Waste,	Joshua Bailey,	116
18.	—— Circular Saw Mills,	David Phillips,	ib.
19.	—— Life Preservers,	Samuel J. Seeley,	117
20.	—— Brick Presses,	W. B. Waldran and Godfrey Hargitt,	ib.
21.	—— Mills for Grinding,	Thomas A. Chandler,	ib.
22.	—— Sash Stopper,	John W. Hoffman,	118
23.	—— Pressing Bonnets,	Miss C. C. Dow,	ib.
24.	—— Distilling Apparatus,	Charles A. Krechler,	ib.
25.	—— Shutter Fasteners,	Jacob Stroop,	ib.
26.	—— Portable Cot Bedsteads,	Abraham McDonough,	119
27.	—— Steam Engines,	R. Van Dyke, Jr., assignee of R. Porter,	ib.
28.	—— Spinning Cotton,	C. K. Tisdale, assignee of J. & T. Keene,	ib.
29.	—— Wheat Cleaning Machines,	David L. Ewing,	ib.
30.	—— Ox Yoke Fastenings,	Andrew Hotchkiss,	120
31.	—— Grinding, &c., Vegetables,	Luther B. Fisher,	ib.
32.	—— Lounge and Chair Combined,	Abner J. Linikin,	ib.
33.	—— Steam Boiler Flues,	Abner Chapman,	ib.
34.	—— Pump Valves,	Thomas Thatcher,	157
35.	—— Winnowing Machines,	Abraham Straub,	ib.
36.	—— Smut Machines,	A. Buel and T. Brown,	ib.
37.	—— Vegetable Cutters,	Wyllys Avery,	158
38.	—— Spark Arresters,	Samuel Swett,	ib.
39.	—— Whiffletree Hook,	A. N. Gray,	ib.
40.	—— Calculating Machines,	Samuel S. Young,	ib.
41.	—— Lamp Wick Tubes,	Cornelius & Co., as's of Cornelius & Wilhelm	ib.
42.	—— Casting Types,	J. Batchelder and S. D. Dyer,	159
43.	—— Seed Planters,	R. H. Springstead,	ib.
44.	—— Hill Side Ploughs,	Allen Eldred,	ib.
45.	—— Sofa Bedsteads,	Edwin B. Bowditch,	ib.
46.	—— Connecting Hubs and Axles,	Junius Foster,	ib.
47.	—— Unloading Carts,	Charles Downer,	ib.
48.	—— Metallic Boot Heels,	G. S. Langdon,	160
49.	—— Ploughs,	John Rich,	ib.
50.	—— Fire Arms,	Benjamin Chambers,	ib.
51.	—— Pegging Boots and Shoes,	James La Dow,	161
52.	—— Gearing Horse Power,	Charles Capels,	ib.
53.	—— Hardening Metals,	Asa Wheeler,	ib.
54.	—— Valves of Rotary Engines,	James P. Ross,	ib.
55.	—— Signal Lanterns,	George Callard,	ib.
56.	—— Beating and Brushing Carpets,	William Peters,	ib.
57.	—— Paring, Coring, and Slicing Apples,	Julius Weed,	ib.
58.	—— Ploughs,	Jesse Warren,	162
59.	—— Filtering Water,	Justin Mulhern,	ib.
60.	—— Bee Hives,	Joseph A. Dugdale,	ib.

RE-ISSUE.

1.	Cleaning Wool and Cotton,	Milton D. Whipple,	163

DESIGNS.

1.	For Stoves,	North, Harrison & Co., as'es of S. W. Gibbs,	ib.
2.	—— Cooking Stoves,	A. C. Barstow,	ib.
3.	—— Stoves,	S. Hill and S. B. Cline,	ib.

August, 1849.

1.	Improvement in Salting Meats,	Thomas Davison,	163
2.	—— Gas Lamps,	Horatio G. Sickel,	ib.
3.	—— Burners for Gas Lamps,	John G. Webb,	164
4.	—— Gas Apparatus,	Andrew Walker, Jr.,	ib.
5.	—— Blocks for Setting Hat Brims,	Sylvester Billings,	ib.
6.	—— Hooks & Eyes for Tapes & Dresses,	Charles Atwood,	ib.
7.	—— Pessaries,	Jonathan H. Robinson,	ib.
8.	—— Bedstead Fastenings,	Henry Miller,	ib.
9.	—— Cleansing Bottles,	Munson C. Crouk,	ib.
10.	—— Closing Gates,	Willard Twitchell,	165
11.	—— Contraction of Car Wheels,	John Murphy,	ib.
12.	—— Spiral Springs,	William Van Anden,	ib.
13.	—— Button Moulds,	J. Hayden and R. Hyde,	ib.
14.	—— Piano Locks,	Peter H. Niles,	ib.
15.	—— Spark Arresters,	Josiah F. Flagg,	ib.
16.	—— Cooking Stoves,	Nicholas Mason,	166
17.	—— Balancing Mill Stones,	Edmund Munson,	ib.
18.	—— Life Boats,	George P. Tewsbury,	ib.
19.	—— Cheese Presses,	Ira Carter,	ib.
20.	—— Road Scrapers,	Benjamin M. Townsend,	167
21.	—— Rice Hullers,	Charles Walker,	ib.
22.	—— Ruling Paper,	William S. Wilder,	ib.
23.	—— Steam Tables,	Edwin Hills,	ib.
24.	—— Uniting Metallic Plates,	Samuel Pratt,	ib.
25.	—— Process of Flouring,	David P. Bonnell,	168
26.	—— Steam Boilers and Furnaces,	Horace Boardman,	ib.
27.	—— Filters for Steam Boilers,	Edmund Blunt,	ib.
28.	—— Covered Buttons,	Hitchcock & Co., ass'es of P. Kirkham,	169
29.	—— Meat Cutters,	Allen Burdick,	ib.
30.	—— Sawing Ship Timber, &c.,	John W. Cochran,	ib.
31.	—— Buttons from Straw Boards,	Elisha M. Pomeroy,	ib.
32.	—— Fire Proof Safes,	E. & J. L. Hall,	170
33.	—— Planetariums,	Benjamin O. Swain,	ib.
34.	—— Car Wheels,	Edward Finch,	ib.
35.	—— Sash and Shutter Fasteners,	A. D. Baldwin, assignee of J. Bell,	171
36.	—— Treenail Machines,	Josiah Kirby,	ib.
37.	—— Sash Fastener and Stopper,	James C. Cochran,	ib.
38.	—— Ice Cream Freezers,	John Decker,	ib.
39.	—— Rotating Tuyeres,	Samuel H. Camp,	ib.
40.	—— Repeating Gun,	G. A. Arrowsmith, ass'e of W. Hunt,	ib.
41.	—— Inkstands,	Andrew Fife,	172
42.	—— Dining Tables,	John C. Nichols,	ib.
43.	—— Spike Machines,	Edwin B. White,	ib.
44.	—— Planing Machines,	Reid R. Throckmorton,	ib.
45.	—— Cutting Bedstead Screws,	J. Garside and H. Betjemann,	ib.
46.	—— Revolving Fire Arms,	E. G. Ripley, admin'r of E. Wesson,	ib.
47.	—— Dressing Treenails,	Jesse Fitzgerald,	ib.
48.	—— Sugar Pans	Alfred Stillman,	173
49.	—— Fountain Pens,	David O. Macomber,	ib.
50.	—— Steam Engines,	R. F. Loper,	ib.
51.	—— Bedstead Fastenings,	Simeon Hovey,	ib.
52.	—— Rock Drilling Machines,	George N. Doan,	ib.
53.	—— Gold Washers,	Michael English,	ib.
54.	—— Hill Side Ploughs,	John W. Thurman,	ib.
55.	—— Straw Cutters,	Lewis Tupper,	174
56.	—— Threshing Machines,	Abram Bloom,	ib.
57.	—— Spinal Supporters,	Henry G. Davis,	ib.
58.	—— Chucks,	J. W. Martin and E. Parry,	ib.
59.	—— Spring Seat Saddles,	Robert Smith,	ib.
60.	—— Railway Chairs,	Sawyer & Hall, ass'es of S. A. Cox,	ib.
61.	—— Carpenters' Squares,	D. J. George and N. Millington,	175
62.	—— Jointing Staves,	Samuel Jobes,	ib.

ADDITIONAL IMPROVEMENT.

1. Lever Scale for Canals, Railroads, &c., E. Ellicott and S. A. Abbott, . 175

RE-ISSUE.

1. Improvement in India Rubber Goods, H. G. Tyer and J. Helm, . ib.

DESIGNS.

1. For Stoves, . . J. G. Lamb and C. Harris, 176
2. —— Stoves, . . . Pease & Co., ass'es of W. L. Sanderson, ib.

September, 1849.

1. Improvement in Spring Mattrasses, . Patrick O'Neil, . . ib.
2. —— Bedstead Fastenings, . James Taylor, . ib.
3. —— Carriage Axles, . . John J. Flack, . . ib.
4. —— Brakes for Railroad Cars, Horace T. Robbins, . ib.
5. —— Crushing Ice, . . A. C. Hobbs and J. Brown, . ib.
6. —— Harness for Looms, . S. Holton, Jr., and W. R. Harris, 177
7. —— Cutting Paper, . . W. Johnson, assignee of A Gilman, ib.
8. —— Operating Shuttle Boxes, C. J. Gardner, assignee of A. Allen, ib.
9. —— Moulds for Glass Pipes, . D. O. Ketchum, assignee of G. Scott, ib.
10. —— Cutting Welts, . Samuel Keen, Jr., . . ib.
11. —— Sash Fasteners, . . Lewis B. Page, . ib.
12. —— Turning Leaves of Books, J. H. Schomacker and M. Kuermerle, 178
13. —— Rotary Steam Engines, . C. M. Miles, . ib.
14. —— Street Sweeping, . Calvin S. Bishop, . . ib.
15. —— Cooking Stoves, . . David Johnston, . ib.
16. —— Wire Heddles, . Abijah J. Williams, . ib.
17. —— Can Hooks, . . George Webber, . 179
18. —— Cotton Gins, . . Stephen R. Parkhurst, . ib.
19. —— Eyes of Hinges, . . David W. Lyon, . ib.
20. —— Jointed Pawls, . Samuel S. Walley, . ib.
21. —— Straw Cutters, . . T. & E. Burrell, . ib.
22. —— Polishing Knives, . A. Munger and R. C. Taylor, . 180
23. —— Registers for Hot Air Furnaces, Charles F. Tuttle, . ib.
24. —— Measuring Distances, . William Würdemann, . . ib.
25. —— Breaking Hides, . . Isaac S. Hershey, . ib.
26. —— Churn Dashers, . William M. Wright, . 231
27. —— Cars for Dumping Earth, . Michael Berney, . ib.
28. —— Horse Powers, . William Ward, . . ib.
29. —— Pumps for Water, . . John B. Read, . ib.
30. —— Cooking Ranges, . Philip Rollhaus, . . 232
31. —— Dressing Shingles, . . Franklin Jenney, . ib.
32. —— Making Brooms, . James Thomas, . . ib.
33. —— Flues for Cooking Stoves, . Henry Bleecker, . ib.
34. —— Cooking Stoves, . William Wheeler, . . ib.
35. —— Cooking Stoves, . . William Sours, . 233
36. —— Cooking Stoves, . Elias Kane, . . ib.
37. —— Signals for Privies, . . J. H. Doughty, . ib.
38. —— Fire Arms, . . George Leonard, Jr., . ib.
39. —— Ploughs, . . . Abraham Christ, . ib.
40. —— Riving and Dressing Shingles, Enoch R. Morrison, . 234
41. —— Churn Dashers, . . Lewis W. Colver, . ib.
42. —— Churn Dashers, . D. N. Egbert, . . ib.
43. —— Couplings for Cars, . Joseph D. Alvord, . ib.
44. —— Gas Generators, . Woodhull & Minturn, as'es Watson & Cart, ib.
45. —— Couplings for Cars, . H. L. B. Lewis, . 235
46. —— Stretching Canvas, Henry Bryant, . . ib.
46. —— Spinning Jacks, . Foster Nowell, . ib.
47. —— Door Locks, . . Edwin B. Horn, . . ib.
48. —— Winnowing Machines, . Alexander Moffitt, . ib.
49. —— Paring and Coring Fruit, . Peter W. Hardwick, . 236
50. —— Suspender Buckles, . Sheldon S. Hartzhorn, . ib.
51. —— Life Boats, . . James D. Greene, . . ib.
52. —— Cauls for Veneering, . Hazard Knowles, . ib.
53. —— Springs for Timepieces, . Levi Beach, . . ib.
54. —— Springs for Chairs, . Thomas E. Warren, . 237
55. —— Dentists' Forceps, . . Edward Bourne, . . ib.

56.	Improvement in Cheese Presses,	Samuel Mann,	237
57.	—— Seed Planters,	James P. Ross,	ib.
58.	—— Jointing Staves,	H. & L. D. Benson,	ib.
59.	—— Hooks and Eyes to Cards,	Charles Atwood,	238
60.	—— Shower Baths,	Jeremiah Essex,	ib.
61.	—— Dissected Maps,	S. M'Cleary and J. Pierce,	ib.
62.	—— Opening and Closing Blinds,	C. Reed and E. Howe, Jr.,	ib.
63.	—— Grain Carriers,	A. Linhart and S. M'Clain,	ib.
64.	—— Grain Drills,	Pierpont Seymour,	ib.

RE-ISSUES.

1.	Improvement in Breaking Coal,	Joseph Battin,	239
2.	—— Looms for Carpets, &c.,	Erastus B. Bigelow,	ib.
3.	—— Looms for Brussels Carpets,		
4.	—— Power Looms,	Do.	240

DESIGNS.

1.	For Portable Grates,	Barstow & Co., assig's of A. Richmond,	ib.
2.	—— Stoves,	James Wager,	ib.
3.	—— Do.		
4.	—— Do.	J. M. French, assignee of C. Fulton,	ib.

October, 1849.

1.	Improvement in Water Gates or Sluices,	Ambrose Torrey,	ib.
2.	—— Copying Presses,	Henry M. Paine,	241
3.	—— Spinning Flax,	Charles Clark,	ib.
4.	—— Couplings for Cars,	Warren D. Hatch,	ib.
5.	—— Mandrils in Lathes,	William A. Chapin, Jr.,	ib.
6.	—— Raising Water,	J. T. Farrand and W. Hinman,	ib.
7.	—— Metallic Packing,	Green S. Cox,	ib.
8.	—— Carding Machines,	Daniel W. Hayden,	242
9.	—— Mould Candles,	Andrew L. Brown,	ib.
10.	—— Making Steel,	N. M. Isham and E. E. Marcy,	ib.
11.	—— Foot Valves for Engines,	S. W. Rogers,	ib.
12.	—— Brakes For Cars,	Nehemiah Hodge,	243
13.	—— Gold Washers,	Lemuel P. Jenks,	ib.
14.	—— Churn Dashers,	T. G. Clinton and G. H. & E. H. Knight,	ib.
15.	—— Making Washboards,	William B. Stewart,	ib.
16.	—— Sewing Machines,	S. C. Blodgett and J. A. Lerow,	ib.
17.	—— Mitre Sawing,	Dennis S. Stow,	244
18.	—— Steam Boilers,	John J. De Haven,	ib.
19.	—— Filing Circular Saws,	Israel F. Brown,	ib.
20.	—— Boot Crimps,	E. R. Horner and W. Holland,	ib.
21.	—— Gold Washers,	Louis Lacharme,	245
22.	—— Portable Ovens,	Calvin Doane,	ib.
23.	—— Water Wheels,	William G. Masterson,	ib.
24.	—— Jointed Centre Board,	Thomas Maskell,	ib.
25.	—— Cooking Stoves,	James Leffel,	ib.
26.	—— Hydraulic Cotton Presses,	Charles Wilson,	240
27.	—— Churns,	Alexander Hall,	ib.
28.	—— Burring Cylinders,	Charles G. Sargent,	ib.
29.	—— Telegraph Wire Supporters,	Livingston, Roggen, Adams, Kendall & Vail,	ib.
30.	—— Hanging Mill Shafts,	Edward Bancroft,	ib.
31.	—— Ore Washers,	Jacob Pritchett,	247
32.	—— Propellers,	Henry W. Hewet,	ib.
33.	—— Band Boxes,	William Tabele,	ib.
34.	—— Paper Engine Bed Plates,	William Clark,	ib.
35.	—— Lapping Machines,	Samuel Campbell,	ib.
36.	—— Cords for Suspenders,	Nelson Goodyear,	248
37.	—— Cooking Stoves,	Hannibal Mathews,	ib.
38.	—— Ploughs,	Benjamin Seyler,	ib.
39.	—— Apple Parers,	Charles P. Carter,	ib.
40.	—— Tanning Leather,	Harmon Hibbard,	ib.
41.	—— Ore Washers,	Peter Von Schmidt,	249
42.	—— Drawing, &c., Heated Iron,	Henry Burden,	ib.
43.	—— Propellers,	Matthew A. Crooker,	ib.

44.	Improvement in Boot Crimps,	Benjamin Livermore,	249
45.	—— Accoucheurs' Chairs,	Newman W. Smith,	ib.
46.	—— Arresting Hemorrhage,	Ashbel B. Haile,	250
47.	—— Looms,	Joseph Reynolds,	ib.
48.	—— Cooking Stoves,	T. G. Clinton and G. H. & E. H. Knight,	ib.
49.	—— Grate Bars,	Cornelius Kingsland,	ib.
50.	—— Attaching Knobs to Doors,	James A. Crever,	ib.
51.	—— Rockers of Gold Washers,	Thomas J. Green,	251
52.	—— Bog Cutting,	Abner Follet,	ib.
53.	—— Spike Machines,	Edwin B. White,	ib.
54.	—— Making Horse Collars,	William Criswell,	ib.
55.	—— Casting Chilled Rolls,	John C. Parry,	ib.
56.	—— Jacquard Looms,	E. B. Bigelow,	ib.
57.	—— Cooking Stoves,	James R. Stafford,	252
58.	—— Spring Latch Bolts,	Elias M. Ray,	ib.
59.	—— Planing Machines,	Enos G. Allen,	ib.
60.	—— Iron Stairs,	Benjamin F. Miller,	253
61.	—— Steam Engine Lever Beam,	William A. Lighthall,	ib.
62.	—— Blocks for Daguerreotype Plates,	Alexander Beckers,	ib.
63.	—— Looms,	Augustus Faulkner,	ib.
64.	—— Invalid Bedsteads,	John Karney,	ib.
65.	—— Distilling Sea Water,	John Ericsson,	254
66.	—— Floor Oil Cloth,	Sparkman & Kelsey, ass'es of W. Berry,	ib.
67.	—— Circular Saw Sets,	Elhanan W. Scott,	ib.
68.	—— Locomotives,	Andrew Cathcart,	255
69.	—— Holding Daguerreotype Plates,	W. & W. H. Lewis,	ib.
70.	—— Fan Blowers,	Frederick S. Barnard,	ib.
71.	—— Gearing,	Benjamin Arnold,	ib.
72.	—— Shingle Machines,	Henry Burt,	256
73.	—— Looms,	Henry Bachofner,	ib.
74.	—— Stoves,	James Cole,	ib.
75.	—— Ledger Accounts,	Andrew J. Folger,	257
76.	—— Barrel Carriages,	William Furley,	ib.
77.	—— Mills for Grinding,	Lewis Fagin,	ib.
78.	—— Weather Strips,	Ebenezer Garnsey,	258
79.	—— Planing Machines,	Jeter & Watson, assignees of H. Jeter,	ib.
80.	—— Flour Packers,	Nathan Kinman,	ib.
81.	—— Fences,	Lucius Leavenworth,	ib.
82.	—— Power Looms,	Roger Lightbown,	ib.
83.	—— Stoves,	Adolphus Lotze,	259
84.	—— Mills for Grinding,	D. Marsh and E. B. Nichols,	ib.
85.	—— Washboards,	Orrin Rice,	ib.
86.	—— Working Sails,	William A. Ross,	ib.
87.	—— Electro-Chemical Telegraphs,	R. Smith and A. Bain,	ib.
88.	—— Straw Cutters,	Jonathan Sullivan,	260
89.	—— Carriage Springs,	William S. Thomas,	ib.
90.	—— Toothed Cylinders,	John L. Tuttle,	ib.
91.	—— Transverse Callipers,	William J. Van Ness,	ib.

RE-ISSUES.

1.	Improvement in Looms for Plaids, &c.,	Erastus B. Bigelow,	261
2.	—— Looms for Brussels Carpets,		
3.	—— Winnowing Machines,	John Thurston,	ib.
4.	—— Seed Planters,	M. & S. Pennock,	ib.

DESIGNS.

1.	For Stoves,	Cox & Co., ass'es of G. W. Chambers,	262
2.	—— Do.		
3.	—— Do.	S. H. Burton,	ib.
4.	—— Do.	S. S. Jewett and F. H. Root,	ib.
5.	—— Do.	William Savery,	ib.
6.	—— Parlor Stoves,	J. Cross & Son, ass'es of S. W. Gibbs,	ib.
7.	—— Stoves,	Edwin B. Finch,	ib.
8.	—— Do.	James Wager,	ib.
9.	—— Parlor Air Tight Stoves,	Moses Pond,	ib.
10.	—— Stoves,	Hosea H. Huntley,	ib.

11. For Air Tight Cooking Stoves, .	John F. Rathbone, .	262
12. —— Wood Stoves, . .		
13. —— Air Tight Cooking Stoves, .		
November, 1849.		
1. Improvement in Gunpowder Magazines,	Charles W. Copeland, .	304
2. —— Turning Lathes, . .	H. Doane and Allen Goodman,	ib.
3. —— Steam Engines, .	John Ericsson, . .	ib.
4. —— Looms for Figured Fabrics, .	Richard Garsed, .	305
5. —— Mowing Machines, .	D. K. & J. K. Harris, .	ib.
6. —— Corn Shellers, . .	Carter, Harris & Carter, .	ib.
7. —— Winnowing Machines, .	A. J. Howell, . .	306
8. —— Regulators, . .	J. F. Mascher, .	ib.
9. —— Harness Hames, .	Charles Pope, . .	ib.
10. —— Rice Hullers, . .	D. H. Southworth and J. R. Hitchcock,	ib.
11. —— Pendulum Balances, .	Elnathan Sampson, .	ib.
12. —— Seed Planters, . .	John W. Sherman, .	307
13. —— Axle Grease Boxes, .	John M. Smart, . .	ib.
14. —— Cleaning Carpets, . .	Joseph Wentworth, .	ib.
15. —— Tailors' Measures, .	James M. Whitham, .	ib.
16. —— Raising, &c., Water, .	James D. Willoughby, .	ib.
17. —— File Supportes, .	J. B. Woodruff and B. M. Townsend,	308
18. —— Fire Engines, . .	John B. Tarr, . .	ib.
19. —— Hemp Machines, .	James Anderson, .	ib.
20. —— Pessaries, . .	Josiah B. Andrews, .	ib.
21. —— Water Closets, . .	Charles C. Bier, .	ib.
22. —— Iron Car Wheels, . .	Thomas S. Bourshett, .	309
23. —— Pulleys for Belts and Brakes,	Mertoun C. Bryant, .	ib.
24. —— Ice Cream Freezers, .	Goldsmith Colleen, Jr., .	ib.
25. —— Seed Drills, . .	Daniel Custer, .	ib.
26. —— Curling Hat Brims, .	Francis Degen, . .	ib.
27. —— Water Wheel Governor, .	James Finlay, .	310
28. —— Turning Lasts, . .	C. Hartshorne and W. B. Shaw, .	ib.
29. —— Connecting Hubs to Axles,	John Kellogg, .	ib.
30. —— Fire Arms, . .	J. B. Klein, assignee of C. Hartung,	ib.
31. —— Tumbler Locks, .	Lewis Lillie, .	311
32. —— Windlasses, . .	Charles Perley, . .	312
33. —— Splitting, &c., Rattans, .	Sylvanus Sawyer, .	ib.
34. —— Dressing Leather, . .	Charles Slawson, . .	ib.
35. —— Brick Presses, . .	Ferdinand Zizemann, .	ib.
36. —— Chronometers for Longitude, .	John Sheldon, . .	313
37. —— Ox Yokes, . .	John Chase, .	ib.
38. —— Scythe Snaths, . .	Luther Cole, . .	ib.
39. —— Augers for Boring Earth,	A. Crafts and E. Weeks, .	ib.
40. —— Distilling, &c., Spirits, .	Carl Falkman, . .	ib.
41. —— Moulding Bricks, .	John W. Frost, .	ib.
42. —— Ink Fountains, . .	Elijah Jordon, . .	ib.
43. —— Table and Bedstead, .	Frank Leslie, .	314
44. —— Seed Drills, . .	Jacob Mumma, . .	ib.
45. —— Making Iron, . .	M. S. Salter, H. Norton, & J. W. Poinier,	ib.
46. —— Connecting Hubs and Axles, .	E. Sampson and A. M. Billings, .	ib.
47. —— Hemp Brakes, .	Augustine Smith, .	ib.
48. —— Piano Fortes, . .	Richard Swan, Jr., .	315
49. —— Welt Cutting and Splitting,	John E. Tucker, .	ib.
50. —— Saw Mills, . .	Thomas Dugard, . .	ib.
51. —— Flood Gates for Fences, .	S. D. Hopkins, .	ib.
52. —— Sofa Bedsteads, . .	John A. Robson, . .	316
53. —— Hearth of Blast Furnaces,	Lorenzo Sibert, .	ib.
54. —— Platform Scales, . .	Thaddeus Fairbanks, .	ib.
55. —— Folding Paper, .	J. H. Gray, assignee of E. N. Smith,	ib.
56. —— Flour Bolts, . .	George W. Brown, .	ib.
57. —— Working Butter, .	Elias H. Merryman, .	317
58. —— Brick Press, . .	A. Woodworth and S. Mower, .	ib.
59. —— Manufacture of Sugar, .	John Scoffern, .	ib.
60. —— Railroad Trucks, . .	John F. Rogers, . .	ib.

61.	Improvement in Dressing Flour,	Charles Learned and Stephen Hughes,	318
62.	—— Harvesting Machines,	Eliakim B. Forbush,	ib.
63.	—— Milking Cows,	Cyrus Knapp,	ib.
64.	—— Blank Account Books,	Charles Hopkins,	ib.
65.	—— Rotary Pumps,	Peter Sweney,	319
66.	—— Glazing Pottery Ware,	Christopher W. Fenton,	ib.
67.	—— Plough and Seed Planter,	William Croasdale,	ib.
68.	—— Boring Machines,	James H. Aldrich,	ib.
69.	—— Combined Stop Cock and Filter,	A. & H. Johnson,	320
70.	—— Twisting Shawl Fringe,	Bay State Mills, ass'e of M. D. Whipple,	ib.
71.	—— Dressing Barrel Heads,	Timothy Shepard,	ib.
72.	—— Valves of Steam Engines,	Charles W. Copeland,	ib.
73.	—— Propellers,	John Patch,	ib.
74.	—— Ringing Fog Bells,	Daniel Jones, Jr.,	ib.

RE-ISSUE.

1.	Improvement in Brussels Carpet Looms,	Erastus B. Bigelow,	321

ADDITIONAL IMPROVEMENTS.

1.	Improvement in Threshing, &c., Grain,	B. G. H. Hathaway,	ib.
2.	—— Seed Planters,	James D. Willoughby,	ib.

DESIGNS.

1.	For Stoves,	Morrison and Tibbits, ass'es of A. Haney,	ib.
2.	—— Do.	Johnson & Cox, ass'es of S. Clark,	322
3.	—— Do.		
4.	—— Do.		

December, 1849.

1.	Improvement in Mills for Grinding,	Sidney A. Bantz and William Andrew,	ib.
2.	—— Window Sash,	Wesley Chase, assignee of W. T. Barnes,	ib.
3.	—— Revolving Scrapers,	Ashley Crafts and Ebenezer Weeks,	ib.
4.	—— Dressing Stone,	William Eayrs,	ib.
5.	—— Grain Separators,	S. W. Fisher,	ib.
6.	—— Railroad Frogs,	H. A. Landry, assignee of J. W. Hoffman,	323
7.	—— File Cutting,	Camillus Kidder,	ib.
8.	—— Cooking Ranges,	Nicholas Mason,	ib.
9.	—— Artificial Teeth,	George E. Murray,	ib.
10.	—— Fire Arms,	Jacob Pecare and Josiah M. Smith,	ib.
11.	—— Mills for Grinding,	Samuel W. Powell,	ib.
12.	—— Pumps for Water,	Alexander Stiven,	324
13.	—— Spinning Hemp,	Garret Van Riper,	ib.
14.	—— Vapor Engines,	Prosper Verdat du Trembly,	ib.
15.	—— Cast Iron Car Wheels,	Hiram H. Wiser,	ib.
16.	—— Buckle Tongues,	Alvah Worster,	ib.
17.	—— Dyeing,	Edward Brierley,	ib.
18.	—— Brick Presses,	John T. Brown and Moses Fuller,	325
19.	—— Bending Hames,	Abel Gardner,	ib.
20.	—— Turning Clothes Pins,	Asa Greenwood,	ib.
21.	—— Trick Locks,	Lewis M. Hartley,	ib.
22.	—— Packing Pump Pistons,	Edwin A. Jeffery,	ib.
23.	—— Spinning Machinery,	Alfred Jenks,	326
24.	—— Looms for Figured Fabrics,	Moses Marshall,	ib.
25.	—— Bedstead Fastenings,	John Moulton,	ib.
26.	—— Hubs for Boxes,	Isaac Munden,	ib.
27.	—— Making Cord,	William E. Nichols,	327
28.	—— Boilers for Cooking Stoves,	Gibson North,	ib.
29.	—— Bedstead Fastenings,	J. Parsons Owen,	ib.
30.	—— Faucet Breech Guns,	Alonzo D. Perry,	ib.
31.	—— Drawing Water from Wells,	Harvey W. Sabin,	328
32.	—— Car Couplings,	Albert G. Safford,	ib.
33.	—— Jointing Staves,	David Vaughan,	ib.
34.	—— Grinding or Polishing Tools,	Joseph Vaughan, Jr.,	329
35.	—— Spike Machines,	Harry A. Wills,	ib.
36.	—— Bending Wood,	Thomas Blanchard,	ib.
37.	—— Bran Dusters,	Robert M. Dempsey,	ib.
38.	—— Making Buttons,	Hitchcock & Co., ass'es of P. Kirkham,	330

39.	Improvement in Clover Harvesters,	Samuel Krauser,	330
40.	—— Indicator for Steam Boilers,	Azel S. Lyman,	ib.
41.	—— Lap and Butt-Welded Tubes,	James M'Carty,	ib.
42.	—— Folding Gates,	Isaac Meritt,	ib.
43.	—— Manufacture of Flax, &c.,	Robert Patterson,	331
44.	—— Signal Lanterns,	Hugh Sangster,	ib.
45.	—— Fire Arms,	Christian Sharps,	ib.
46.	—— Churn Dashers,	Henry Stanton,	ib.
47.	—— Rotary Engines,	Henry G. Thompson,	ib.
48.	—— Bottle Fasteners,	Isaac Winslow,	332
49.	—— Locks for Fire Arms,	Andrew Wurfflein,	ib.
50.	—— Dressing Staves,	Asa Broad,	ib.
51.	—— Locks for Fire Arms,	Orison Blunt,	ib.
52.	—— Drawing Boards,	Henry W. Chamberlain,	ib.
53.	—— Flutes,	Charles G. Christman,	339
54.	—— Thin Iron Castings,	H. & W. E. Bleecker & S. D. Vose,	ib.
55.	—— Earth Borer and Elevator,	Phinehas Dow,	ib.
56.	—— Cast Iron Car Wheels,	Carmi Hart,	ib.
57.	—— Bedsteads,	Benjamin Hinkley,	ib.
58.	—— Breech Loading Fire Arms,	G. A. Arrowsmith, ass'e of L. Jennings,	ib.
59.	—— Packing for Pistons, &c.,	William Crofton Moat,	335
60.	—— Railroad Trucks,	J. W. Moyer,	ib.
61.	—— Seed Planters,	Jacob Pierson,	ib.
62.	—— Wheels for Carriages,	Isaac B. Ward,	ib.
63.	—— Portable Lanterns,	Nathaniel Waterman,	ib.
64.	—— Boring Window Blinds,	John Wiley,	ib.
65.	—— Rotting Hemp, &c.,	Lemuel W. Wright,	336

RE-ISSUES.

1.	Improvement in Rolling Mills,	John S. Hall,	ib.
2.	—— Fire Proof Safes,	E. & J. L. Hall,	ib.
3.	—— Harvesting Machines,	Francis S. Pease,	ib.
4.	—— Sectional Canal Boats,	John Elgar,	337
5.	—— Billiard Table Cushions,	Abraham Bassford,	ib.
6.	—— Manufacturing India Rubber,	Charles Goodyear,	ib.
7.	Felting India Rubber with Cotton Fibre,	Do.	338

ADDITIONAL IMPROVEMENT.

1.	Improvement in Harness Saddles,	Joseph W. Briggs,	ib.

DESIGNS.

1.	For Stoves,	Daniel F. Goodhue and Charles Guild,	ib.
2.	—— Do.	Samuel Hill and William B. Cline,	ib.
3.	—— Cooking Stoves,	Joseph G. Lamb and Conrad Harris,	ib.
4.	—— Stoves,	Dunham & Co., ass'es of W. L. Sanderson,	ib.
5.	—— Girandoles,	William F. Shaw,	ib.
6.	—— Stoves,	Wm. C. Davis, ass'e of Hosea H. Huntley,	ib.

January, 1850.

1.	Improvement in Pen and Pencil Cases,	Albert G. Bagley,	374
2.	—— Grinding and Bolting Machines,	James M. Clark,	ib.
3.	—— Paring Horses' Hoofs,	Ashley Crafts and Ebenezer Weeks,	ib.
4.	—— Hemp Brakes,	Jonathan Crane and F. H. Hamilton,	ib.
5.	—— Coal Grates,	Chauncey O. Greene,	375
6.	—— Shuttle Boxes for Looms,	A. Jenks, ass'e of Goodyear & Hirst,	ib.
7.	—— Hemp Scutchers,	F. H. Hamilton and Thomas Bullock,	ib.
8.	—— Connecting Brakes with Cars,	John Kimball and Harvey Rice,	ib.
9.	—— Washing Machines,	Ransom Marean,	ib.
10.	—— Blind and Shutter Fastener, &c.,	William Maguire,	376
11.	—— Stump Extractor,	John Rogers,	ib.
12.	—— Making Cotton Cordage,	Franklin Slaughter and David Perry,	ib.
13.	—— Branding Tools,	Lewis Stark,	ib.
14.	—— Printers' Type Cases,	John Bell,	ib.
15.	—— Steam and Water Engines,	James Black,	377
16.	—— Grain Drills,	William Bullock,	ib.
17.	—— Cultivators,	Ashley Crafts and Ebenezer Weeks,	ib.
18.	—— Cotton Gins,	John Du Bois,	ib.
19.	—— Car Wheels,	George W. Eddy,	ib

20.	Improvement in Smut Machines,	Joseph G. Goshon,	378
21.	—— Curing Tobacco Stems,	Thomas Hoyt,	ib.
22.	—— Ore Washers,	William M. Hughes,	ib.
23.	—— Counterbalancing Sashes,	William Maguire,	ib.
24.	—— Boring Instruments,	Lewis W. Miller,	ib.
25.	—— Coating Iron with Copper, &c.,	Ebenezer G. Pomeroy,	ib.
26.	—— Churns,	Z. C. Robbins,	ib.
27.	—— Making Cotton Cordage,	Franklin Slaughter and David Perry,	379
28.	—— Lightning Rods,	James Spratt,	ib.
29.	—— Dressing Shingles,	Augustus Welch and Robert Walker,	ib.
30.	—— Cutting Shingles,	William Wood,	ib.
31.	—— Sawing Irregular Forms,	Oliver Wright,	ib.
32.	—— Mowing Machines,	Homer Adkins,	380
33.	—— Gates for Fences,	Jesse Bailey,	ib.
34.	—— Folding Bedsteads,	John Binder,	ib.
35.	—— Stove Pipes,	Frederick Bleier,	ib.
36.	—— Mills for Grinding,	Charles W. Brown,	ib.
37.	—— Brick Presses,	Charles Carnell,	381
38.	—— Files for Papers,	Edwin D. Dood,	ib.
39.	—— Obstetrical Supporters,	W. W. Finch, J. Blaisdell & L. Babbitt,	ib.
40.	—— Harvesting Machines,	John E. Heath,	ib.
41.	—— Substitute for Clevis,	J. & W. D. Howell & J. Sipe,	ib.
42.	—— Cider Mills,	Samuel Jackson,	382
43.	—— Hydraulic Engine Valves,	C. S. Van Wagoner, ass'e of W. Kennish,	ib.
44.	—— Tongueing and Grooving,	Robert Kittle,	ib.
45.	—— Buckles,	George R. Kelsey,	ib.
46.	—— Door Locks,	William Maguire,	ib.
47.	—— Circular Saw Mills,	Nicholas G. Norcross,	383
48.	—— Spinning Machinery,	Josiah G. Reed,	384
49.	—— Winnowing Machines,	Abraham Straub,	ib.
50.	—— Fastening Harness Hames,	M. Taylor, assignee of T. Taylor,	ib.
51.	—— Boring Machines,	Andrew Weikart,	ib.
52.	—— Trusses for Hernia,	William R. Battle,	ib.
53.	—— Candle Moulds,	Herman Camp,	ib.
54.	—— Seeding Apparatus,	David Eberle,	385
55.	—— Bedstead Fastenings,	Matthew Elder,	ib.
56.	—— Corn Shellers,	Daniel Hoats,	ib.
57.	—— Slide Valves,	William W. Hubbard,	ib.
58.	—— Tuyeres,	John Pawling,	ib.
59.	—— Portable Furnaces,	Merritt F. Porter,	ib.
60.	—— Spark Arresters,	James Radley and John W. Hunter,	386
61.	—— Cases for Daguerreotypes,	Ann F. Styles,	ib.
62.	—— Opening, &c., Shutters,	George Welsh,	ib.
63.	—— Illuminating Gas,	Stephen White,	ib.
64.	—— Seed Planters,	William B. Willis,	387
65.	—— Boring and Mortising,	Eli K. Wisell,	ib.
66.	—— Atmospheric Churns,	John Young,	ib.
67.	—— Cotton Presses,	A. D. Brown,	ib.
68.	—— Brick Presses,	John Butler,	ib.
69.	—— Wash Mixtures,	Stephen Crane,	ib.
70.	—— Utero-Vaginal Supporters,	Russel Caulkins,	388
71.	—— Steam Furnaces,	English, Bennet, Frisbee & Crawford,	ib.
72.	—— Illuminating Gas,	Abraham Gesner,	ib.
73.	—— Manures,	Robert Hare,	ib.
74.	—— Heating Air,	Adrian Janes,	389
75.	—— Self-Waiting Tables,	Josiah Lamb,	ib.
76.	—— Gear for Puppet Valves,	Thomas McLaughlin,	ib.
77.	—— Manufacture of Sugar,	L. de Saulles, ass'e of L. H. F. Melsens,	ib.
78.	—— Bobbins on Spindles,	Oliver Pearl,	ib.
79.	—— Gearing for Sugar Mills,	Edward Phelps,	390
80.	—— Sinking Hollow Piles,	Lawrence H. Potts,	ib.
81.	—— Looms for Piled Fabrics,	James Turnbull, Jr., and John Turnbull,	ib.
82.	—— Grinding Mills,	B. Gould, assignee of J. W. Webb,	ib.
83.	—— Flour Bolts,	John M. Reed and William B. Willis,	ib.

ADDITIONAL IMPROVEMENT.

1. Improvement in Ice Cream Freezers, H. B. Masser, . . 391

RE-ISSUES.

1. Improvement in Carding and Spinning, R. S. Stewart, Ex'r G. Law, as'e M. Chase, ib.
2. —— Churns, . . . Z. C. Robbins, . . ib.
3. —— Cooking Stoves, . James Root, . ib.

DESIGN.

1. For Stoves, . . . Henry L. Sheperd, . 392

February 1850.

1. Improvement in Spooling Machinery, Avery Babbett, . . ib.
2. —— Bats for Felting, . Samuel G. Blackman, . ib.
3. —— Portable Soup Bread, . Gail Borden, Jr, . . ib.
4. —— Excavating Augers, . James Buck, . ib.
5. —— Whip Lashes, . . D. N. & E. B. Day, . 393
6. —— Cutting Staves, . Charles B. Hutchinson, . ib.
7. —— Washing Machines, . Joel Haines, . . ib.
8. —— Sash Supporters, . Joseph Maynard, . ib.
9. —— Carding and Drawing Wool, . Charles Jackson and James Moir, 394
10. —— Punching between Rollers, Richard Montgomery, . ib.
11. —— Calculating Machines, . Du Bois D. Parmelee, . ib.
12. —— Water Metres, . William Sewell, Jr., . ib.
13. —— Lightning Conductors, . James Spratt, . . ib.
14. —— Barrel Machinery, . Solomon Andrews, . 395
15. —— Cutting Cotton Stalks, . Fields Bradshaw, . . ib.
16. —— Folding Cloth, . Augustus C. Carey and Daniel C. Bagley, ib.
17. —— Rule and Socket Joints, . Charles Chinnock, . . ib.
18. —— Flyers and Spindles, . John Dermond, . ib.
19. —— Air Heating Furnaces, . Henry A. Engles, . . 396
20. —— Augers for Boring, . George Flautt, . ib.
21. —— Horse Rakes, . . Alvan Hovey, . . ib.
22. —— Hanging Carriages, . M. G. Hubbard, . ib.
23. —— Railroad Trucks, . . James Ingersoll, . . ib.
24. —— Planing Machines, . Nicholas G. Norcross, . 397
25. —— Bedclothes Clasps, . . Francis A. Rockwell, . ib.
26. —— Tanning Apparatus, . William H. Rosensteel, . ib
27. —— Smut Machines, . . Leonard Smith, . . ib.
28. —— Window Shutter Fasteners, Samuel B. Snedaker, . 398
29. —— Electric Telegraphs, . William S. Thomas, . ib.
30. —— Furniture Castors, . Solomon B. Ulmann, . ib.
31. —— Trucks for Cars, . . George Vanderhoof, . ib.
32. —— Turning Umbrella Sticks, Solomon West and Hiram Plumb, ib.
33. —— Studs for Shirt Bosoms, . James P. Heiss, . . 399
34. —— Carriage Tops, . John L. Allen, . ib.
35. —— Rollers for Window Curtains, Edward S. Clark, . . ib.
36. —— Cooking Stoves, . T. G. Clinton, and G. H. & E. H. Knight, ib.
37. —— Carriage Tops, . . Solomon Goddard and Henry Warfield, 400
38. —— Portable Safes, . Henry Hochstrasser, . ib.
39. —— Varnishing Buttons, . Elisha M. Pomeroy, . ib.
40. —— Portable Fences, . Peter M. Purdy, . . ib.
41. —— Hulling Clover Seed, . A. R. McGriff, admin'r of Jos. Pollock, ib.
42. —— Kneading Dough, . Henry N. Rider, . . ib.
43. —— Plate for Harness, . . J. B. & S. Sawyer, ass'es of O. Ramsdell, 401
44. —— Bedstead Fastenings, . Robert Ramsey, . ib.
45. —— Fences, . . . Isaiah Subers, . . ib.
46. —— Seed Planting Barrows, . } Charles A. Wakefield, ib.
47. —— Seed Planters, . . }
48. —— Figures on Wood, . Hamilton Wood, . . ib.
49. —— Measuring Cloth on Looms, . J. W. Robertson and J. G. Webster, 402
50. —— Seraphines, . . Rufus H. Green, . . ib.
51. —— Cutting Cap Fronts, . George Burgess, . ib.
52. —— Gas Apparatus, . Christopher F. Brown, . ib.
53. —— Sofa Bedsteads, . . Edwin B. Bowditch, . ib.
54. —— Connecting Hubs with Axles, Junius Foster, . . 403
55. —— Churn Dashers, . . Isaac D. Garlick, . ib.

56. Improvement in Iron Railings,	William Hamilton,	403
57. —— Clothes Frames,	Humphrey Kempton,	ib.
58. —— Refrigerators,	Ephraim Larrabee,	ib.
59. —— Scale Beams,	Samuel T. McDougall,	ib.
60. —— Cutting Meat,	John G. Perry,	ib.
61. —— Distilling Oleaginous Matter,	Anthony M. Poisat and David C. Knab,	404
62. —— Casting Chilled Rolls,	John C. Parry,	ib.
63. —— Steering Apparatus,	Jesse Reed,	ib.
64. —— Stoves,	Peter Sweney,	405
65. —— Hydrolator,	Zuriel Swope,	ib.
66. —— Making Coffee,	Nathaniel Waterman,	ib.
67. —— Spinning Yarn, &c.,	J. Carpenter, assignee of C. Whipple,	ib.
RE-ISSUES.		
1. Improvement in Curry Combs,	William Beach,	406
2. —— Distilling,	Charles A. Krechler,	ib.
3. —— Attaching Balls to Cartridges,	W. R. Palmer, assignee of W. Hunt,	ib.
4. —— Loaded Balls,	G. A. Arrowsmith, assignee of W. Hunt,	ib.
DESIGNS.		
1. For Stoves,	Peter J. Simmons,	ib.
2. —— Cooking Stoves,	Joseph G. Lamb and Conrad Harris,	407
3. —— Stoves,	W. P. Cresson, as'e Stuart, Cresson & Co.	ib.
4. —— Do.		
5. —— Do.		
6. —— Do.	Samuel D. Vose,	ib.
7. —— Do.		
8. —— Do.	Sexton & Co., assignees of J. H. Conklin,	ib.
9. —— Do.	Jeremiah D. Green and George Warren,	ib.
10. —— Do.	Lathrop S. Bacon,	ib.
11. —— Do.	Clute & Brothers, as'es W. L. Sanderson,	ib.

Acid on Vitrification—On the Influence of Boracic . . 140
Andes—Steam for the 135
Arts Regarded as Unhealthy—Premiums Awarded for the Introduction of Improved Methods in 356
Atlantic Steam Navigation 413
Atmospheric Electricity upon the Wires of the Magnetic Telegraph—Effects of 276

Bacmeister, H.—Investigation of the Proper Profile of a Crane with Movable Carriage 344
Beaver Meadow Railroad and Coal Co.—Extracts from the Annual Report of the 220
Birkinbine & Co.'s Report on Warming and Ventilating the Lunatic Asylum 270
Boracic Acid on Vitrification—On the Influence of . . . 140
Bricks for Furnaces—A Composition for Fire . . 356
Bridge at Lochabar, Scotland—Notice of the Opening of the Victoria Suspension 302
——— First Great Tube of the Britannia . . 75
——— Notice of the Opening of the Britannia Tubular . . 372
——— Progress of the Work of the Britannia . . 73
Bridges—Mr. Stephenson's Remarks on Suspension . . 368
——— On Breaking of Railway . . . 156
——— under the Passage of Heavy Bodies—Deflexion of Railway . 7
Buffers and Springs—India Rubber . . . 156

BIBLIOGRAPHICAL NOTICES.

Bridges, Viaducts, Tunnels, &c., of the United States Railroads. By G. Duggin 288
Encyclopedia of Mechanics, Enginework, and Engineering. By Oliver Byrne 144
——————— Chemistry. By Prof. J. C. Booth . . 360

Canal Commissioners of Pennsylvania—Annual Report of the . . 82
Carbonate of Lime as an Ingredient of Sea Water . . 52
Cast Iron—Analytic Investigation of . . . 141
Chemistry—Notice of Booth's Encyclopedia of . . 360
Coal Mines—On Preventing Explosions in . . . 8
—— Mining 300 Years Ago . . . 75
Coals for the Steam Navy—Report on . . . 52

Copper—Experiments on Copper containing Phosphorus, and on the Corrosive Effect of Sea Water on some varieties of - - - - 137
Corrosion of Steam Boilers—On the Means of Preventing the - 197
Crane with Movable Carriage—Investigation of the Proper Profile of the Top Beam of a 344
Crystallized Bodies for Electricity of Tension—Note on the Superficial Conducting Power of - - - - - 353

Damsel, H. L.—On the Manufacture of Iron in South Wales - 339
Domestic Life—Lecture on the Sciences as Applicable to - - 187, 262
Dry Docks—Notice of the United States - - - - 203

Electrical Machines to Work in all Weathers—Note on a Means of Causing - 354
Electricity of Tension—Note on the Superficial Conducting Power of Crystallized Bodies for - - - - - 353
——— upon the Wires of the Magnetic Telegraph—Effects of Atmospheric 276
Electro-Telegraphic Communication in England, Prussia, and America—On the Present State of - - - - - 198
Encyclopedia of Chemistry—Notice of Prof. Booth's - - 360
——— ——— Mechanics, Enginework, and Engineering. By O. Byrne—Notice of 144
Engine—Notice of a New Rotary - - - 46
——— ——— the Pneumatic Spheroidal - - 372
Engines—Method of Regulating the Flow of the Injection Water into the Condensers, applicable principally to Marine - - - 138
——— on Railways—On the Use of Small - - - - 10
Engineering—Remarks on American - - - 145, 221
Engraving upon Ivory—Process of - - - 279
Explosion of a Steam Boiler in the City of New York—Account of the - 204
——— the Steamboat "Louisiana"—Account of the - - 43
——— a Locomotive on the Chartres Railway, France - 357
——— the Locomotive Engine "Boston"—Report on the - - 282
Explosions in Coal Mines—On Preventing - - 8
——— Jones on the Means of Preventing Boiler - - 133

Fairbairn on Smelting Magnetic Iron Ore - - - 125
Fire Bricks for Furnaces—On a Composition for - - 356
Floors of Paris—On the Pottery and Iron - - - - 55
Friction of Water—On the - - - 199

FRANKLIN INSTITUTE.

Proceedings of the Monthly Meetings - - 57, 142, 213, 286, 358, 416

Committee on Science and the Arts.

Report on B. F. Palmer's Artificial Leg - - - 60

Committee on Exhibitions.

Address Delivered at the Close of the 19th Exhibition, by Judge Kane - 65

Girders—Experiments on the Deflexion of Iron - - - 303
Grape Sugar—On a New Sugar Homologous with - - 285
Grinding Plain or Spherical Surfaces—Mode of - - - 46

Hazard, E.—Mode of Grinding Plain or Spherical Surfaces - - 46
Haupt, H.—Formula for Calculating the Strain upon Timber - 408
Heat by Magnetism—On the Direct Production of - - 208
——— Formula for Calculating the Expansion of Liquids by - 49

India Rubber Buffers and Springs - - - 156
Iron—Analytical Investigation of Cast - - - 141
——— Floors of Paris—On the Pottery and - - 55
——— from its Compounds—On Some Phenomena of Reduction; a New Method of Separating - - - - 354
——— from Oxidation—Protection of - - - 209
——— Girders—Experiments on the Deflexion of - - 303
——— in South Wales—On the Manufacture of - - - 339

Iron—On the Change of Internal Structure in - - - 369
—— On the Quality and Mixtures of - - - - 362
—— Ores—Fairbairn on Smelting Magnetic - - - 125
—— Roofing for a Railway Station at Liverpool - - - - 10
—— to Railway Structures—Report on the Application of - - 289, 361
Ivory—Process of Engraving upon - - - 279

Jones, A. C.—Account of the Explosion of the Steamboat "Louisiana" - 43

Leg—Report on B. F. Palmer's Artificial - - 60
Levelling Staves—A New Method of Graduating - - - 76
Lighthouses—Improvements in the Dioptric Lights for - - 58
———— Description of a New Dioptric Instrument for Increasing the Intensity of the Light for - - - - 81
Lightning by Rain—On the Production of - - - 193, 197
Liquids by Heat—Formula for Calculating the Expansion of - 49
——— Prof. Graham on the Diffusion of - - - 210
Locomotive Engine "Boston—Report on the Explosion of the - 282
———— on the Chartres Railroad, France—Account of the Explosion of a - 357
Locomotives—Remarks on American - - - 145, 221

Magnetic Iron Ore—Fairbairn on Smelting - - 125
———— Telegraph—Effects of Atmospheric Electricity upon the Wires of the 276
Magnetism—On the Direct Production of Heat by - - 208
Marine Boilers—On Supplying Fresh Water to - - - 131, 209
——— Engines—Regulationg the Flow of Injection Water into the Condenser, Applicable to - - - - 138
——— Steamers—Experiments on Paddle Wheels for - - 1, 208, 277
Materials—Rennie's Experiments on the Strength of - - 201
Melsen's Process for Extracting Sugar from the Sugar Cane - 349
Meteor—Notice of a - - - - 413
Mines—On Preventing Explosions in Coal - - 8
Mining 300 Years Ago—Coal - - - - 75
Molecules by the Influence of Another System—Memoir on the Perturbations Produced in the Vibratory Movements of a System of - - - 280

Navy—Report on Coals for the Steam - - - 52

Ohio and Pennsylvania Railroad Co.—Extract from the Annual Report of the 219
Ores—Fairbairn on Smelting Magnetic Iron - - - 125
Oxidation—Protection of Iron from - - 209
———— of Rails in and out of use—On the - - - 11

Paddle Wheels for Steamers—Experiments on - - - 1, 277
———————— Marine Steamers—Experiments on - - 208
Parker's Water Wheel?—Who Invented - - - 347
Paving the Streets of the Metropolis - - - 371
Pennsylvania—Annual Report of the Canal Commissioners of the State of - 82
———— Railroad Co.—Extracts from the Annual Report of the - 217
Philadelphia and Reading Railroad Co—Extracts from the Annual Report of the 223
Phosphorus—Experiments on Copper containing - - 137
Photography on Paper - - - - 134
Pneumatico-Spheroidal Engine—Notice of the - - 372
Pottery and Iron Floors of Paris—On the - - - 55
Pressure Indicator—Description of a - - - 12

Quartz—On the Elliptical Double Refraction of - - 351

Rain—On the Production of Lightning by - - 193, 197
Rails in and out of use—Report on the Oxidation of - - 11
Railroad and Coal Co.—Extracts from the Annual Report of the Beaver Meadow 220
——— Co.—Extracts from the Annual Report of the Ohio and Pennsylvania 219
———————————————— Pennsylvania - 287
———————————————— Philadelphia and Reading 223

Railroads of the United States—Notice of Duggin's Illustrations of the Bridges, Viaducts, &c., of the - - - - - 288
Railway Bridges—On the Breaking of - - - - 156
———— under the Passage of Heavy Bodies—Deflexion of - 7
——— Buffers and Springs—India Rubber - - - 156
——— Carriages from one line to another—Dunn's Mode of Removing 222
——— Station at Liverpool—Iron Roofing for a - - 10
——— Stocks—Dividends on - - - 156
——— Structures—Report on the Application of Iron to - - 289, 361
——— Works—On the Vastness of - - - 13
Railways—On the Use of Small Engines on - - - 10
——— Revenue of British - - - 155
Reduction; a New Method of Separating Iron from its Compounds—On some Phenomena of - - - - 354
Rotary Engine—Account of a New - - - 46

Sciences as Applicable to Domestic Life—Lecture on - - 187, 262
Smelting Magnetic Iron Ores—Fairbairn on - - 125
Spheroidal Engine—Notice of the Pneumatico- - - 372
Steam and Other Vapors—On the Equation between the Temperature and the Maximum Elasticity of - - - - 121, 181
—— Boat "Niagara"—Report of the Accident on board the - 274
———— "Lousiana"—Account of the Explosion of the - - 43
—— Boiler in the City of New York—Account of the Explosion of a - 204
—— Boilers—Jones on the Means of Preventing Explosions in - 133
———— On the Means of Preventing the Corrosion of - 197
———— On Supplying Fresh Water in Marine - - 131
—— Engine—Notice of a Double Piston - - 356
———— On the Economy of the - - 48, 133, 213
—— Engines—Method of Regulating the Flow of the Injection Water into the Condenser, applicable principally to Marine - - 138
—— for the Andes - - - - - 125
—— Navigation—Atlantic - - - - 413
—— Navy—Report on Coals for the - - - 52
—— Ship "Atlantic"—Notice of the - - - 280
———— ———— Description of the - - - 352
———— "Baltic"—Notice of the - - - 279
———— "Philadelphia"—Particulars of the - - 48
———— ———— Performance of the - - - 139
———— "Powhattan"—Notice of the Launch of the - - 200
———— "Susquehanna"—Description of the United States - - 351
—— Vessels—Report of the Application of the Wave Principle to the Construction of 79
Steamer "Tennessee" round Cape Horn—Notice of the Trip of the - 415
Steamers—Experiments on Paddle Wheels for - - 1, 208, 277
———— Notice of the Launch of three - - - 203
———— "Ohio" and "Georgia"—Notice of the - - 277
Stocks—Dividends on Railway - - - - 156
Street Paving of the Metropolis - - - 371
Strength of Materials—Rennie's Experiments on the - - 201
Sugar Cane—Melsen's Process for Extracting Sugar from the - 348
—— Improvements in - - - - 132
—— Homologous with Grape Sugar—On a New - - 285
Suspension Bridge at Lochabar, Scotland—Notice of the Opening of the Victoria 302
———— Bridges—Mr. Stephenson's Remarks on - - 368

Telegraph—Effects of Atmospheric Electricity upon the Wires of the Magnetic 276
Telegraphic Communication in England, Prussia, and America—On the Present State of Electro- - - - - - 198
Thermometric Scale—On a New - - - 202
Timber—Formula for Calculating the Strain upon - - 407
Tubular Bridge—Notice of the Opening of the Britannia - 372

Uranium in its Ores—A New Method of Determining - - 415